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Attorneys for Plaintiff
 APPLE INC.

UNITED STATES DISTRICT COURT

FOR THE NORTHERN DISTRICT OF CALIFORNIA

CV 10-03216

Civil Action No.

EDL

APPLE INC., a California corporation,

Plaintiff,

v.

EFORCITY CORPORATION, a California corporation; ACCSTATION INC., a California corporation; ITRIMMING INC., a California corporation; EVERYDAYSOURCE INC., a California corporation; UNITED INTEGRAL INC., a California corporation; CRAZYONDIGITAL, INC., a California corporation; and BOXWAVE CORPORATION, a Nevada corporation; and DOES 1 through 20, inclusive,

Defendants.

COMPLAINT FOR PATENT INFRINGEMENT, TRADEMARK INFRINGEMENT AND UNFAIR COMPETITION

DEMAND FOR JURY TRIAL

Plaintiff Apple Inc. ("Apple"), for its complaint against Defendants, alleges as follows:

INTRODUCTION

1. Apple has instituted the present action against Defendants herein to ensure quality and compatibility with Apple's products and to prevent the unfair and unlawful exploitation of its intellectual property. Apple seeks an injunction against Defendants' unlawful conduct, as well as an award of its actual damages and attorneys' fees as provided by law.

2. Apple develops and sells a revolutionary consumer electronics product, the iPod® digital music player. First launched in October 2001, the iPod® has become one of the most widely-acclaimed and sought-after consumer products of all time. The *Washington Post* described the iPod® as “a work of technological art.” With over 240 million iPod® devices sold to date, Apple has transformed how millions of music lovers acquire, manage and use their music and video. In June 2007, Apple launched another of its ground-breaking products – the iPhone®. Named the Invention of the Year by Time Magazine in 2007, the iPhone® has enjoyed tremendous market success, with over 40 million iPhone® devices sold to date. In April 2010, Apple launched yet another of its revolutionary products, the iPad™, which sold 3 million units in its first 80 days of availability. The iPad™ is a mobile digital device allowing users to connect with their apps, content and the Internet in a more intimate, intuitive and fun way than ever before.

3. The consumer acceptance of the iPod®, iPhone® and iPad™ has sparked demand for compatible accessories, including cables, chargers, docking stations, speaker systems, FM transmitters, and numerous other products. In order to ensure the quality, reliability and compatibility of these accessories, and to protect the value of its goodwill and intellectual property relating to the iPod®, iPhone® and iPad™ brands, Apple maintains a robust licensing program called Made for iPod® (“MFi”), through which third party companies can obtain Apple’s authorization and license to manufacture, sell and distribute iPod®, iPhone® and iPad™ compatible accessories. A number of imitators, however, are selling “knock-offs” that copy Apple’s products in an attempt to capitalize on Apple’s success in the marketplace without entering Apple’s MFi licensing program.

4. As more fully alleged below, Defendants manufacture, distribute and/or sell accessories for the iPod®, iPhone® and iPad™ that are not licensed or otherwise sponsored by Apple. These products are frequently advertised and sold in a manner that falsely and unfairly implies affiliation with Apple and infringes Apple’s valuable intellectual property. Many are of inferior quality and reliability, raising significant concerns over compatibility with, and damage to, Apple’s products. As one consumer remarked:

Stay away from this one!!! This product is garbage. First one I received

1 was defective and did not charge my 3G Ipod, but instead like some other
2 people have said, drained my battery to the point my ipod would not even
3 turn on. Second one I received as a replacement did the same exact thing.
Lesson learned for me so next potential buyer beware.

4 5. Defendants' infringing conduct as alleged herein has damaged Apple and inflicted
5 irreparable harm, and Apple brings this lawsuit to redress that harm.

6 **PARTIES**

7 6. Apple is a California corporation with its principal place of business located at 1
8 Infinite Loop, Cupertino, California. Founded in 1976, Apple has been consistently ranked as one
9 of the most innovative companies in the world. Apple makes and sells well-known computer
10 hardware, software and consumer electronics products including the Macintosh® line of computers
11 and the iPod®, iPhone® and iPad™ line of mobile digital devices. Apple employs approximately
12 28,000 people worldwide, owns and operates over 200 retail stores, and sells its products online.

13 7. Upon information and belief, Defendant Eforcity Corporation ("Eforcity") is a
14 California corporation having its principal place of business at 12339 Denholm Dr., El Monte, CA
15 91732. Eforcity's registered agent for service of process is Jack Sheng, 12339 Denholm Dr., El
16 Monte, CA 91732.

17 8. Upon information and belief, Defendant Accstation Inc. ("Accstation") is a
18 California corporation having its principal place of business at 12339 Denholm Dr., El Monte, CA
19 91732. Accstation's registered agent for service of process is Jack Sheng, 12339 Denholm Dr., El
20 Monte, CA 91732.

21 9. Upon information and belief, Defendant Itrimming Inc. ("Itrimming") is a California
22 corporation having its principal place of business at 12339 Denholm Dr., El Monte, CA 91732.
23 Itrimming's registered agent for service of process is Jack Sheng, 12339 Denholm Dr., El Monte,
24 CA 91732.

25 10. Upon information and belief, Defendant Everydaysource Inc. ("Everydaysource") is
26 a California corporation having its principal place of business at 12339 Denholm Dr., El Monte, CA
27 91732. Everydaysource's registered agent for service of process is Jack Sheng, 12339 Denholm
28 Dr., El Monte, CA 91732.

11. Upon information and belief, Defendant United Integral Inc. is a California corporation having its principal place of business at 4961 Santa Anita Ave #D, El Monte, CA, 91780. United Integral's registered agent for service of process is Catalina Du, 4961 Santa Anita Ave #D, El Monte, CA, 91780. Upon information and belief, United Integral also does business as firegadgets.com, Skque, crazyproducts, crazyproductsstore, and Ultimadetrendstore (collectively "United Integral").

12. Upon information and belief, Defendant Crazyondigital, Inc. ("Crazyondigital") is a California corporation having its principal place of business at 2021 Las Positas Ct., Ste. 145, Livermore, CA 94551. Crazyondigital's registered agent for service of process is Binita Singh, 2021 Las Positas Ct., Ste. 145, Livermore, CA 94551.

13. Upon information and belief, Defendant Boxwave Corporation ("Boxwave") is a Nevada corporation having its principal place of business at 227 Bellevue Way N.E. #558, Bellevue, WA 98004. Boxwave's registered agent for service of process is CSC Services of Nevada, Inc., 502 East John Street, Carson City, NV 89706.

14. Apple is ignorant of the true names and capacities of Defendants sued herein as Does 1 through 20, inclusive, and therefore sues said Defendants by such fictitious names. Apple will amend this Complaint, if necessary, to allege their true names and capacities when ascertained.

JURISDICTION AND VENUE

15. This Court has subject matter jurisdiction pursuant to 28 U.S.C. §§1331 and 1338(a)-(b) and 15 U.S.C. §1121 because this action arises under the patent and trademark laws of the United States.

16. Venue is proper in this judicial district pursuant to 28 U.S.C. §§1391(b)-(c) and 1400(b) as Defendants have done business in this judicial district, have committed acts of patent infringement and trademark infringement in this judicial district, and continue to commit such acts in this judicial district, entitling Apple to relief as hereinafter set forth.

INTRADISTRICT ASSIGNMENT

17. Because this is an Intellectual Property Action, it may be assigned on a district-wide basis pursuant to Civil Local Rule 3-2(c).

FACTUAL ALLEGATIONS

18. Apple has devoted substantial time and resources to developing, manufacturing and marketing its iPod®, iPhone® and iPad™ brands of mobile digital devices. The first generation iPod® was introduced in October 2001; the second generation iPod® was introduced in July 2002; and the third generation iPod® was released in April 2003. The current line of iPod® products includes the iPod® shuffle; the iPod® classic; the iPod® nano; and the iPod® touch. The first generation iPhone® was introduced in June 2007; the iPhone® 3G was released in July 2008; the iPhone® 3GS was released in June 2009; and the iPhone® 4 was released in June 2010. The iPad™ was released in April 2010.

19. The Apple brand, including its registered trademarks, is one of the most famous brands in the world. Since its inception, Apple has continuously and extensively promoted, offered and sold its goods and services in interstate commerce under the various Apple trademarks. The Apple brand and trademarks consistently are ranked by independent research organizations as being among the fifty most valuable brands on earth.

20. As a result of Apple's continuous and extensive use and promotion, the consuming public nationwide understands that Apple's various marks identify Apple's goods and services, and associates the marks with Apple exclusively. Because of the consistent quality of Apple's goods and services marketed under and in association with Apple's trademarks, Apple has established considerable good will and reputation with respect to its goods and services.

21. Since their inception, the iPod®, iPhone® and iPad™ have spawned numerous accessory devices manufactured and sold by companies other than Apple, including, among others, cables, chargers, docking stations, speaker systems, and FM transmitters that are designed to work exclusively with the iPod®, iPhone® and iPad™.

22. To ensure the quality, reliability and compatibility of these accessories, Apple implemented the MFi licensing program that allows manufactures, distributors and retailers of iPod®, iPhone® and iPad™ accessories to obtain the benefits of Apple's proprietary technology, intellectual property and support, and to use the "Made for iPod"® logo in their packaging and advertising. Apple has developed a growing international portfolio of intellectual property rights

1 protecting different aspects of the iPod®, iPhone® and iPad™, which in the United States includes
 2 various utility patents, design patents and trademarks.

3 23. Upon information and belief, Defendant Eforcity distributes and/or sells various
 4 iPod®, iPhone® and/or iPad™ accessories in this District and elsewhere that are not licensed or
 5 otherwise authorized by Apple, including, but not limited to: car chargers identified as
 6 DAPPIPODCC07, DAPPIPODCC08, DAPPIPODCC09, DAPPIPODCC10, DAPPIPODTC12, and
 7 DAPPIPODTC13; AV composite cables identified as CAPPIPODAT2, CAPPIPODAT4, and
 8 CAPPIPODAT5; docking cradles with remotes identified as DAPPIPODCR10 and
 9 DAPPIPODCR11; docking cradles identified as DAPPIPODCR12 and CAPPIPHOCRA2;
 10 retractable cables identified as DAPPIPODDA15 and DAPPIPODDAT3; cables identified as
 11 DAPPIPODDAT2, DAPPIPODDAT4, and DAPPIPODDA11; FM transmitters identified as
 12 DAPPIPODFM05, DAPPIPODFM07, DAPPIPODFM08, DOTHXXXXFM12,
 13 DOTHXXXXFM15, DOTHXXXXFM17, DOTHXXXXFM19, DOTHXXXXFM21, and
 14 DOTHXXXXFM22; speaker systems identified as DAPPIPODSPK1 and DOTHXXXXSP18;
 15 chargers identified as CAPPIPHOPHC1; backup batteries identified as CAPPIPHOLI02 and
 16 CAPPIPHOLI06; and AV adapters identified as CAPPIPHOAD01 and CAPPIPHOAD08. Upon
 17 information and belief, Defendant Eforcity uses Apple's registered trademarks U.S. Reg. Nos.
 18 3,679,056; 2,715,578; and 3,341,286 in connection with its advertising and sales, including sales of
 19 the aforementioned products.

20 24. Upon information and belief, Defendant Accstation distributes and/or sells various
 21 iPod®, iPhone® and/or iPad™ accessories in this District and elsewhere that are not licensed or
 22 otherwise authorized by Apple, including, but not limited to: car chargers identified as
 23 DAPPIPODCC07, DAPPIPODCC08, DAPPIPODCC09, DAPPIPODCC10, DAPPIPODTC12, and
 24 DAPPIPODTC13; AV composite cables identified as CAPPIPODAT2, CAPPIPODAT4, and
 25 CAPPIPODAT5; docking cradles with remotes identified as DAPPIPODCR10 and
 26 DAPPIPODCR11; docking cradles identified as DAPPIPODCR12 and CAPPIPHOCRA2;
 27 retractable cables identified as DAPPIPODDA15 and DAPPIPODDAT3; cables identified as
 28 DAPPIPODDAT2, DAPPIPODDAT4, and DAPPIPODDA11; FM transmitters identified as

1 DAPPIPODFM05, DAPPIPODFM07, DAPPIPODFM08, DOTHXXXXFM12,
 2 DOTHXXXXFM15, DOTHXXXXFM17, DOTHXXXXFM19, DOTHXXXXFM21, and
 3 DOTHXXXXFM22; speaker systems identified as DAPPIPODSPK1 and DOTHXXXXSP18;
 4 chargers identified as CAPPIPHOPHC1; backup batteries identified as CAPPIPHOLI02 and
 5 CAPPIPHOLI06; and AV adapters identified as CAPPIPHOAD01 and CAPPIPHOAD08. Upon
 6 information and belief, Defendant Accstation uses Apple's registered trademarks U.S. Reg. Nos.
 7 3,679,056; 2,715,578; and 3,341,286 in connection with its advertising and sales, including sales of
 8 the aforementioned products.

9 25. Upon information and belief, Defendant Itrimming distributes and/or sells various
 10 iPod®, iPhone® and/or iPad™ accessories in this District and elsewhere that are not licensed or
 11 otherwise authorized by Apple, including, but not limited to: car chargers identified as
 12 DAPPIPODCC07, DAPPIPODCC08, DAPPIPODCC09, DAPPIPODCC10, DAPPIPODTC12, and
 13 DAPPIPODTC13; AV composite cables identified as CAPPIPODAT2, CAPPIPODAT4, and
 14 CAPPIPODAT5; docking cradles with remotes identified as DAPPIPODCR10 and
 15 DAPPIPODCR11; docking cradles identified as DAPPIPODCR12 and CAPPIPHOCRA2;
 16 retractable cables identified as DAPPIPODDA15 and DAPPIPODDAT3; cables identified as
 17 DAPPIPODDAT2, DAPPIPODDAT4, and DAPPIPODDA11; FM transmitters identified as
 18 DAPPIPODFM05, DAPPIPODFM07, DAPPIPODFM08, DOTHXXXXFM12,
 19 DOTHXXXXFM15, DOTHXXXXFM17, DOTHXXXXFM19, DOTHXXXXFM21, and
 20 DOTHXXXXFM22; speaker systems identified as DAPPIPODSPK1 and DOTHXXXXSP18;
 21 chargers identified as CAPPIPHOPHC1; backup batteries identified as CAPPIPHOLI02 and
 22 CAPPIPHOLI06; and AV adapters identified as CAPPIPHOAD01 and CAPPIPHOAD08.

23 26. Upon information and belief, Defendant Everydaysource distributes and/or sells
 24 various iPod®, iPhone® and/or iPad™ accessories in this District and elsewhere that are not
 25 licensed or otherwise authorized by Apple, including, but not limited to: car chargers identified as
 26 DAPPIPODCC07, DAPPIPODCC08, DAPPIPODCC09, DAPPIPODCC10, DAPPIPODTC12, and
 27 DAPPIPODTC13; AV composite cables identified as CAPPIPODAT2, CAPPIPODAT4, and
 28 CAPPIPODAT5; docking cradles with remotes identified as DAPPIPODCR10 and

1 DAPPIPODCR11; docking cradles identified as DAPPIPODCR12 and CAPPIPHOCRA2;
 2 retractable cables identified as DAPPIPODDA15 and DAPPIPODDAT3; cables identified as
 3 DAPPIPODDAT2, DAPPIPODDAT4, and DAPPIPODDA11; FM transmitters identified as
 4 DAPPIPODFM05, DAPPIPODFM07, DAPPIPODFM08, DOTHXXXXFM12,
 5 DOTHXXXXFM15, DOTHXXXXFM17, DOTHXXXXFM19, DOTHXXXXFM21, and
 6 DOTHXXXXFM22; speaker systems identified as DAPPIPODSPK1 and DOTHXXXXSP18;
 7 chargers identified as CAPPIPHOPHC1; backup batteries identified as CAPPIPHOLI02 and
 8 CAPPIPHOLI06; and AV adapters identified as CAPPIPHOAD01 and CAPPIPHOAD08. Upon
 9 information and belief, Defendant Everydaysource uses Apple's registered trademarks U.S. Reg.
 10 Nos. 3,679,056 and 2,715,578 in connection with its advertising and sales, including sales of the
 11 aforementioned products.

12 27. Upon information and belief, Defendant United Integral distributes and/or sells
 13 various iPod®, iPhone® and/or iPad™ accessories in this District and elsewhere that are not
 14 licensed or otherwise authorized by Apple, including, but not limited to: cables identified as APL-
 15 IPD-3_5-RET, APL-IPD-EXT-ADPT, APL-IPD-USB-RET, APL-IPD-USB-STR-7CM, APL-IPD-
 16 USB-STR, APL-IPD-USB-STR-BLK, APL-IPH-AV-USB-STR-WHT, BNDL-APL-IPD-USB-
 17 STR-BLK-X2, BNDL-APL-IPD-USB-STR-X2, BNDL-IPOD-CLAS-3ACRY-USB, and BNDL-
 18 IPD-USBWALLC-2ACRY; chargers identified as APL-IPH-3G-CARC, APL-IPH-3G-CARC-
 19 BLK, APL-IPH-3G-WALLC-BLK, APL-IPH-3GS-CARC, APL-IPH-3GS-WALLC, BNDL-IPD-
 20 CARWALLC, APL-IPD-WALLC, APL-IPD-CARC, APL-IPD-NAN-3G-AV-STR-WHT, BNDL-
 21 IPH-3G-CARWALLUSB, BNDL-IPOD-CLAS-3ACRY-USB2, BNDL-IPH-3G-3ACRY-USB,
 22 BNDL-IPH-3G-3ACRY-USB, and APL-IPH-3G-CARC; and FM transmitters identified as APL-
 23 IPH-FMTR-6IN1, APL-IPH-FMTR-6IN1-WHT, FMTR-5IN1-BLK, FMTR-5IN1-WHT, and
 24 BNDL-IPD-TCH-8-ACRY. Upon information and belief, Defendant United Integral uses Apple's
 25 registered trademarks U.S. Reg. Nos. 3,679,056 and 2,715,578 in connection with its advertising
 26 and sales, including sales of the aforementioned products.

27 28. Upon information and belief, Defendant Crazyondigital distributes and/or sells
 28 various iPod®, iPhone® and/or iPad™ accessories in this District and elsewhere that are not

licensed or otherwise authorized by Apple, including, but not limited to: cables identified as iPhoneSyncCable01 – ASIN, iPodSyncCable01 - ASIN5, and iPodSyncRetractableCable01 – ASIN; chargers identified as iphone3G_CAR_charger_ASIN; cradles identified as iPhone3G_Metal_CRADLE-UPC and iPhone3G_Plastic_CRADLE; FM transmitters identified as FM2in1BLK-iPhone_3G – ASIN, FM2in1BLK-iPhone_3G - ASIN1, FMALLKIT_, FMALLKIT_LCD_ASIN4, iPhone3G_FM2in1BLK_ASIN6, FM2in1BLK-iPhone3G-UPC, FM2in1BLK-iPhone3GS-UPC_, FM4in1_iphone_NS – ASIN, FM8in1_ARM_RV008 – CrazyOD, FM8in1_BLK_iphone_3G_UPC, iPh3G_FM6in1_Remote, iPhone_iTRIP_FM_REMOTE –UPC, iPhone3G_FM8in1BLK_ASIN, and iPhone3G_iTRIP_NEW03REMOTE-Touch2G-UPC.

29. Upon information and belief, Defendant Boxwave distributes and/or sells various iPod®, iPhone® and/or iPad™ accessories in this District and elsewhere that are not licensed or otherwise authorized by Apple, including, but not limited to: cables identified as miniSync™ for Apple iPhone 3G and DirectSync™ Cable for Apple iPhone 3G; chargers identified as Micro Car Charger – Apple iPhone 3G and Wall Charger Direct™ for Apple iPhone 3G; and cradles identified as Desktop Cradle – Apple iPhone 3G.

30. As alleged further below, the various iPod®, iPhone® and/or iPad™ accessories offered by Defendants infringe Apple’s patent and trademark rights. By misappropriating Apple’s proprietary technology and designs, and by utilizing Apple’s registered word and design trademarks, Defendants are infringing on Apple’s intellectual property and are wrongfully and unfairly exploiting Apple’s name and reputation.

FIRST CLAIM FOR RELIEF

(Infringement of U.S. Patent No. 7,627,343)

(Against All Defendants)

31. Apple incorporates by reference paragraphs 1 through 30 above.

32. On December 1, 2009, United States Patent No. 7,627,343 (“the ’343 patent”) was duly and legally issued for an invention entitled: “Media Player System.” Apple is the assignee of the ’343 patent and continues to hold all rights and interest in the ’343 patent. A copy of the ’343 patent is attached hereto as Exhibit A.

33. Defendants Eforcity, Accstation, Itrimming, Everydaysource, United Integral, Crazyondigital, and Boxwave have directly infringed and continue to directly infringe at least claim 9 of the '343 patent through their manufacture, use, sale, importation and/or offer for sale of unlicensed iPod®, iPhone® and/or iPad™ accessories including, but not limited to, the specific AV adapters, backup batteries, cables, chargers, cradles, FM transmitters, and speaker systems identified above with respect to each of said Defendants. Apple anticipates that additional infringing products will be found and will duly accuse such products as discovery progresses. Said Defendants' advertisements and marketing materials, including but not limited to internet websites, encourage customers to infringe the '343 patent through use of the identified products with the iPod®, iPhone® and/or iPad™ devices. The identified products are especially made or especially adapted for use with the iPod®, iPhone® and/or iPad™ devices in a manner that infringes the '343 patent, are not staple articles or commodities of commerce, and are not suitable for substantial noninfringing use.

34. Said Defendants' infringement of the '343 patent has caused and continues to cause damage to Apple in an amount to be determined at trial.

35. Said Defendants' infringement as herein alleged will continue to cause immediate and irreparable harm to Apple for which there is no adequate remedy at law, unless this Court enjoins and restrains such activities.

SECOND CLAIM FOR RELIEF

(Infringement of U.S. Patent No. 7,305,506)

(Against Defendants Eforcity, Accstation, Itrimming, Everydaysource, and Crazyondigital)

36. Apple incorporates by reference paragraphs 1 through 30 above.

37. On December 4, 2007, United States Patent No. 7,305,506 ("the '506 patent") was duly and legally issued for an invention entitled: "Method and System for Transferring Status Information Between a Media Player and an Accessory." Apple is the assignee of the '506 patent and continues to hold all rights and interest in the '506 patent. A copy of the '506 patent is attached hereto as Exhibit B. Apple filed a Request for Certificate of Correction of the '506 patent in the United States Patent and Trademark Office. When the Certificate of Correction issues, Apple will

1 seek leave to amend this Complaint if necessary and appropriate.

2 38. Defendants Eforcity, Accstation, Itrimming, Everydaysource, and Crazyondigital
3 have directly infringed and continue to directly infringe at least claim 1 of the '506 patent through
4 their manufacture, use, sale, importation and/or offer for sale of unlicensed iPod®, iPhone® and/or
5 iPad™ accessories including, but not limited to, the specific cradles and FM transmitters identified
6 above with respect to each of said Defendants. Apple anticipates that additional infringing products
7 will be found and will duly accuse such products as discovery progresses. Said Defendants'
8 advertisements and marketing materials, including but not limited to internet websites, encourage
9 customers to infringe the '506 patent through use of the identified products with the iPod®and/or
10 iPhone® devices. The identified products are especially made or especially adapted for use with the
11 iPod® and/or iPhone® devices in a manner that infringes the '506 patent, are not staple articles or
12 commodities of commerce, and are not suitable for substantial noninfringing use.

13 39. Said Defendants' infringement of the '506 patent has caused and continues to cause
14 damage to Apple in an amount to be determined at trial.

15 40. Said Defendants' infringement as herein alleged will continue to cause immediate
16 and irreparable harm to Apple for which there is no adequate remedy at law, unless this Court
17 enjoins and restrains such activities.

18 **THIRD CLAIM FOR RELIEF**

19 (Infringement of U.S. Patent No. 7,587,540)

20 (Against Defendants Eforcity, Accstation, Itrimming, Everydaysource, and Crazyondigital)

21 41. Apple incorporates by reference paragraphs 1 through 30 above.

22 42. On September 8, 2009, United States Patent No. 7,587,540 ("the '540 patent") was
23 duly and legally issued for an invention entitled: "Techniques for Transferring Status Information
24 Between an Accessory and a Multi-Communication Device." Apple is the assignee of the '540
25 patent and continues to hold all rights and interest in the '540 patent. A copy of the '540 patent is
26 attached hereto as Exhibit C.

27 43. Defendants Eforcity, Accstation, Itrimming, Everydaysource, and Crazyondigital
28 have directly infringed and continue to directly infringe at least claim 1 of the '540 patent through

1 their manufacture, use, sale, importation and/or offer for sale of unlicensed iPod®, iPhone® and/or
 2 iPad™ accessories including, but not limited to, the specific cradles and FM transmitters identified
 3 above with respect to each of said Defendants. Apple anticipates that additional infringing products
 4 will be found and will duly accuse such products as discovery progresses. Said Defendants’
 5 advertisements and marketing materials, including but not limited to internet websites, encourage
 6 customers to infringe the ’540 patent through use of the identified products with the iPod® and/or
 7 iPhone® devices. The identified products are especially made or especially adapted for use with the
 8 iPod® and/or iPhone® devices in a manner that infringes the ’540 patent, are not staple articles or
 9 commodities of commerce, and are not suitable for substantial noninfringing use.

10 44. Said Defendants’ infringement of the ’540 patent has caused and continues to cause
 11 damage to Apple in an amount to be determined at trial.

12 45. Said Defendants’ infringement as herein alleged will continue to cause immediate
 13 and irreparable harm to Apple for which there is no adequate remedy at law, unless this Court
 14 enjoins and restrains such activities.

15 **FOURTH CLAIM FOR RELIEF**

16 (Infringement of U.S. Patent No. 7,590,783)

17 (Against Defendants Eforcity, Accstation, Itrimming, Everydaysource, and Crazyondigital)

18 46. Apple incorporates by reference paragraphs 1 through 30 above.

19 47. On September 15, 2009, United States Patent No. 7,590,783 (“the ’783 patent”) was
 20 duly and legally issued for an invention entitled: “Method and System for Transferring Status
 21 Information Between a Media Player and an Accessory.” Apple is the assignee of the ’783 patent
 22 and continues to hold all rights and interest in the ’783 patent. A copy of the ’783 patent is attached
 23 hereto as Exhibit D.

24 48. Defendants Eforcity, Accstation, Itrimming, Everydaysource, and Crazyondigital
 25 have directly infringed and continue to directly infringe at least claim 1 of the ’783 patent through
 26 their manufacture, use, sale, importation and/or offer for sale of unlicensed iPod®, iPhone® and/or
 27 iPad™ accessories including, but not limited to, the specific cradles and FM transmitters identified
 28 above with respect to each of said Defendants. Apple anticipates that additional infringing products

will be found and will duly accuse such products as discovery progresses. Said Defendants' advertisements and marketing materials, including but not limited to internet websites, encourage customers to infringe the '783 patent through use of the identified products with the iPod® and/or iPhone® devices. The identified products are especially made or especially adapted for use with the iPod® and/or iPhone® devices in a manner that infringes the '783 patent, are not staple articles or commodities of commerce, and are not suitable for substantial noninfringing use.

49. Said Defendants' infringement of the '783 patent has caused and continues to cause damage to Apple in an amount to be determined at trial.

50. Said Defendants' infringement as herein alleged will continue to cause immediate and irreparable harm to Apple for which there is no adequate remedy at law, unless this Court enjoins and restrains such activities.

FIFTH CLAIM FOR RELIEF

(Infringement of U.S. Patent No. 7,529,870)

(Against Defendants Eforcity, Accstation, Itrimming, Everydaysource, and Crazyondigital)

51. Apple incorporates by reference paragraphs 1 through 30 above.

52. On May 5, 2009, United States Patent No. 7,529,870 ("the '870 patent") was duly and legally issued for an invention entitled: "Communication Between an Accessory and a Media Player with Multiple Lingoes" Apple is the assignee of the '870 patent and continues to hold all rights and interest in the '870 patent. A copy of the '870 patent is attached hereto as Exhibit E. Apple filed a Request for Certificate of Correction of the '870 patent in the United States Patent and Trademark Office. When the Certificate of Correction issues, Apple will seek leave to amend this Complaint if necessary and appropriate.

53. Defendants Eforcity, Accstation, Itrimming, Everydaysource, and Crazyondigital have directly infringed and continue to directly infringe at least claim 29 of the '870 patent through their manufacture, use, sale, importation and/or offer for sale of unlicensed iPod®, iPhone® and/or iPad™ accessories including, but not limited to, the specific cradles and FM transmitters identified above with respect to each of said Defendants. Apple anticipates that additional infringing products will be found and will duly accuse such products as discovery progresses. Said Defendants'

1 advertisements and marketing materials, including but not limited to internet websites, encourage
 2 customers to infringe the '870 patent through use of the identified products with the iPod® and/or
 3 iPhone® devices. The identified products are especially made or especially adapted for use with the
 4 iPod® and/or iPhone® devices in a manner that infringes the '870 patent, are not staple articles or
 5 commodities of commerce, and are not suitable for substantial noninfringing use.

6 54. Defendants' infringement of the '870 patent has caused and continues to cause
 7 damage to Apple in an amount to be determined at trial.

8 55. Defendants' infringement as herein alleged will continue to cause immediate and
 9 irreparable harm to Apple for which there is no adequate remedy at law, unless this Court enjoins
 10 and restrains such activities.

11 **SIXTH CLAIM FOR RELIEF**

12 (Infringement of U.S. Patent No. 7,529,872)

13 (Against Defendants Eforcity, Accstation, Itrimming, and Everydaysource)

14 56. Apple incorporates by reference paragraphs 1 through 30 above.

15 57. On May 5, 2009, United States Patent No. 7,529,872 ("the '872 patent") was duly
 16 and legally issued for an invention entitled: "Communication Between an Accessory and a Media
 17 Player Using a Protocol with Multiple Lingoos." Apple is the assignee of the '872 patent and
 18 continues to hold all rights and interest in the '872 patent. A copy of the '872 patent is attached
 19 hereto as Exhibit F.

20 58. Defendants Eforcity, Accstation, Itrimming, and Everydaysource have directly
 21 infringed and continue to directly infringe at least claim 1 of the '872 patent through their
 22 manufacture, use, sale, importation and/or offer for sale of unlicensed iPod®, iPhone® and/or
 23 iPad™ accessories including, but not limited to, the specific cradles and FM transmitters identified
 24 above with respect to each of said Defendants. Apple anticipates that additional infringing products
 25 will be found and will duly accuse such products as discovery progresses. Said Defendants'
 26 advertisements and marketing materials, including but not limited to internet websites, encourage
 27 customers to infringe the '872 patent through use of the identified products with the iPod® and/or
 28 iPhone® devices. The identified products are especially made or especially adapted for use with the

iPod® and/or iPhone® devices in a manner that infringes the '872 patent, are not staple articles or commodities of commerce, and are not suitable for substantial noninfringing use.

59. Said Defendants' infringement of the '872 patent has caused and continues to cause damage to Apple in an amount to be determined at trial.

60. Said Defendants' infringement as herein alleged will continue to cause immediate and irreparable harm to Apple for which there is no adequate remedy at law, unless this Court enjoins and restrains such activities.

SEVENTH CLAIM FOR RELIEF

(Infringement of U.S. Patent No. 7,580,255)

(Against Defendants Eforcity, Accstation, Itrimming, and Everydaysource)

61. Apple incorporates by reference paragraphs 1 through 30 above.

62. On August 25, 2009, United States Patent No. 7,580,255 ("the '255 patent") was duly and legally issued for an invention entitled: "Docking Station for Hand Held Electronic Devices." Apple is the assignee of the '255 patent and continues to hold all rights and interest in the '255 patent. A copy of the '255 patent is attached hereto as Exhibit G.

63. Defendants Eforcity, Accstation, Itrimming, and Everydaysource have directly infringed and continue to directly infringe at least claim 1 of the '255 patent through their manufacture, use, sale, importation and/or offer for sale of unlicensed iPod® and/or iPhone® accessories including, but not limited to, the specific cradles identified above as DAPPIPODCR10 and DAPPIPODCR11 with respect to each of said Defendants. Apple anticipates that additional infringing products will be found and will duly accuse such products as discovery progresses. Said Defendants' advertisements and marketing materials, including but not limited to internet websites, encourage customers to infringe the '255 patent through use of the identified products with the iPod® and/or iPhone® devices. The identified products are especially made or especially adapted for use with the iPod® and/or iPhone® devices in a manner that infringes the '255 patent, are not staple articles or commodities of commerce, and are not suitable for substantial noninfringing use.

64. Said Defendants' infringement of the '255 patent has caused and continues to cause damage to Apple in an amount to be determined at trial.

65. Said Defendants' infringement as herein alleged will continue to cause immediate and irreparable harm to Apple for which there is no adequate remedy at law, unless this Court enjoins and restrains such activities.

EIGHTH CLAIM FOR RELIEF

(Infringement of U.S. Patent No. D588,545)

(Against All Defendants)

66. Apple incorporates by reference paragraphs 1 through 30 above.

67. On March 17, 2009, United States Patent No. D588,545 ("the '545 patent") was duly and legally issued for an invention entitled: "Connectors." Apple is the assignee of the '545 patent and continues to hold all rights and interest in the '545 patent. A copy of the '545 patent is attached hereto as Exhibit H.

68. Defendants have directly infringed and continue to directly infringe the '545 patent through their manufacture, use, sale, importation and/or offer for sale of unlicensed iPod®, iPhone® and/or iPad™ accessories including, but not limited to, United Integral's APL-IPD-USB-STR-7CM, APL-IPD-USB-STR, APL-IPD-USB-STR-BLK, APL-IPD-USB-RET, BNDL-APL-IPD-USB-STR-BLK-X2, BNDL-APL-IPD-USB-STR-X2, BNDL-IPD-TCH-8-ACRY, BNDL-IPH-3G-3ACRY-USB, BNDL-IPH-3G-3ACRY-USB2, BNDL-IPH-3G-CARWALLUSB, BNDL-IPH-3G-CARWALLUSB2, and BNDL-IPOD-CLAS-3ACRY-USB products; Crazyondigital's iPodSyncCable01-ASIN5 product; Boxwave's miniSync for Apple iPhone 3G and DirectSync Cable for Apple iPhone 3G products; and the following products of Eforcity, Accstation, Everydaysource, and Itrimming: CAPPIPODAT4, DAPPIPODDA15, and DAPPIPODDAT3. Apple anticipates that additional infringing products will be found and will duly accuse such products as discovery progresses. Said Defendants' advertisements and marketing materials, including but not limited to internet websites, encourage customers to infringe the '545 patent through use of the identified products with the iPod®, iPhone® and/or iPad™ devices. The identified products are especially made or especially adapted for use with the iPod®, iPhone® and/or iPad™ devices in a manner that infringes the '545 patent, are not staple articles or commodities of commerce, and are not suitable for substantial noninfringing use.

69. Said Defendants' infringement of the '545 patent has caused and continues to cause damage to Apple in an amount to be determined at trial. Apple is also entitled to an award of Defendants' profits derived from the infringement pursuant to 35 U.S.C. §289.

70. Said Defendants' infringement as herein alleged will continue to cause immediate and irreparable harm to Apple for which there is no adequate remedy at law, unless this Court enjoins and restrains such activities.

NINTH CLAIM FOR RELIEF

(Infringement of U.S. Patent No. D596,621)

(Against Defendants Eforcity, Accstation, Itrimming, Everydaysource, Crazyondigital, and Boxwave)

71. Apple incorporates by reference paragraphs 1 through 30 above.

72. On July 21, 2009, United States Patent No. D596,621 ("the '621 patent") was duly and legally issued for an invention entitled: "Docking Station." Apple is the assignee of the '621 patent and continues to hold all rights and interest in the '621 patent. A copy of the '621 patent is attached hereto as Exhibit I.

73. Defendants Eforcity, Accstation, Itrimming, Everydaysource, Crazyondigital, and Boxwave have directly infringed and continue to directly infringe the '621 patent through their manufacture, use, sale, importation and/or offer for sale of unlicensed iPod® and/or iPhone® accessories including, but not limited to, Boxwave's Desktop Cradle – Apple iPhone 3G product, Crazyondigital's iPhone3G_Plastic_CRADLE product, and the following products of Eforcity, Accstation, Everydaysource, and Itrimming: DAPPIPODCR10, DAPPIPODCR11, and DAPPIPODCR12. Apple anticipates that additional infringing products will be found and will duly accuse such products as discovery progresses. Said Defendants' advertisements and marketing materials, including but not limited to internet websites, encourage customers to infringe the '621 patent through use of the identified products with the iPod® and/or iPhone® devices. The identified products are especially made or especially adapted for use with the iPod® and/or iPhone® devices in a manner that infringes the '621 patent, are not staple articles or commodities of commerce, and are not suitable for substantial noninfringing use.

74. Said Defendants' infringement of the '621 patent has caused and continues to cause damage to Apple in an amount to be determined at trial. Apple is also entitled to an award of Defendants' profits derived from the infringement pursuant to 35 U.S.C. §289.

75. Said Defendants' infringement as herein alleged will continue to cause immediate and irreparable harm to Apple for which there is no adequate remedy at law, unless this Court enjoins and restrains such activities.

TENTH CLAIM FOR RELIEF

(Infringement of U.S. Patent No. D578,110)

(Against Defendants Eforcity, Accstation, Itrimming, Everydaysource, and Crazyondigital)

76. Apple incorporates by reference paragraphs 1 through 30 above.

77. On October 7, 2008, United States Patent No. D578,110 ("the '110 patent") was duly and legally issued for an invention entitled: "Docking Station." Apple is the assignee of the '110 patent and continues to hold all rights and interest in the '110 patent. A copy of the '110 patent is attached hereto as Exhibit J.

78. Defendants Eforcity, Accstation, Itrimming, Everydaysource, and Crazyondigital have directly infringed and continue to directly infringe the '110 patent through their manufacture, use, sale, importation and/or offer for sale of unlicensed iPod® and/or iPhone® accessories including, but not limited to, Crazyondigital's iPhone3G_Metal_CRADLE and iPhone3G_Plastic_CRADLE products and the following products of Eforcity, Accstation, Everydaysource, and Itrimming: DAPPIPODCR10 and DAPPIPODCR11. Apple anticipates that additional infringing products will be found and will duly accuse such products as discovery progresses. Said Defendants' advertisements and marketing materials, including but not limited to internet websites, encourage customers to infringe the '110 patent through use of the identified products with the iPod® and/or iPhone® devices. The identified products are especially made or especially adapted for use with the iPod® and/or iPhone® devices in a manner that infringes the '110 patent, are not staple articles or commodities of commerce, and are not suitable for substantial noninfringing use.

79. Said Defendants' infringement of the '110 patent has caused and continues to cause

1 damage to Apple in an amount to be determined at trial. Apple is also entitled to an award of
 2 Defendants' profits derived from the infringement pursuant to 35 U.S.C. §289.

3 80. Said Defendants' infringement as herein alleged will continue to cause immediate
 4 and irreparable harm to Apple for which there is no adequate remedy at law, unless this Court
 5 enjoins and restrains such activities.

6 **ELEVENTH CLAIM FOR RELIEF**

7 (Trademark Infringement)

8 (Against Defendants Eforcity, Accstation, Everydaysource, and United Integral)

9 81. Apple incorporates by reference paragraphs 1 through 30 above.

10 82. Apple owns various registered trademarks, including: the Apple Design Mark®
 11 (U.S. Reg. Nos. 3,679,056 and 2,715,578) and the Made for iPod Design Mark® (U.S. Reg. No.
 12 3,341,286), (collectively "the Apple trademarks"). Copies of the Apple trademark registrations are
 13 attached hereto as Exhibits K, L and M.

14 83. Without Apple's consent, Defendants Eforcity, Accstation, Everydaysource, and
 15 United Integral have used the Apple trademarks in connection with the sale, offer for sale,
 16 distribution, marketing, and/or advertising of Defendants' iPod®, iPhone® and/or iPad™
 17 accessories online.

18 84. Said Defendants' acts of trademark infringement have been committed with the
 19 intent to cause and are likely to cause confusion, mistake or deception, and are in violation of
 20 Section 32 of the Lanham Act, 15 U.S.C. §1114.

21 85. Said Defendants' infringement as herein alleged has and will continue to cause
 22 immediate and irreparable harm to Apple for which there is no adequate remedy at law, unless this
 23 Court enjoins and restrains such activities.

24 86. Upon information and belief, Apple alleges that said Defendants' infringement of the
 25 Apple trademarks as alleged herein is intentional and exceptional, entitling Apple to an award of
 26 said Defendants' profits, Apple's damages, costs and attorneys' fees, pursuant to 15 U.S.C.
 27 §1117(a).
 28

TWELFTH CLAIM FOR RELIEF

(Unfair Competition Under Federal Law)

(Against Eforcity, Accstation, Itrimming, Everydaysource, and United Integral)

87. Apple incorporates by reference paragraphs 1 through 30 and 82 through 86 above.

88. The use in commerce, by Defendants Eforcity, Accstation, Itrimming, Everydaysource, and United Integral, of marks identical and/or confusingly similar to the Apple trademarks constitutes false designation of origin and misleading representations of fact that are likely to cause confusion, mistake, and/or deceive as to the affiliation, connection or association with Apple and/or its goods and services, in violation of Section 43(a) of the Lanham Act, 15 U.S.C. §1125(a).

89. As a direct and proximate result of said Defendants' activities, Apple has suffered damages and, unless said Defendants are enjoined, Apple will continue to suffer monetary loss and irreparable injury to its business, reputation and goodwill.

90. Upon information and belief, Apple alleges that said Defendants' unfair competition as alleged herein is an exceptional case and intentional. Accordingly, Apple is entitled to an award of said Defendants' profits, Apple's damages, costs and attorneys' fees, pursuant to 15 U.S.C. §1117(a) and as otherwise provided by law.

PRAYER FOR RELIEF

WHEREFORE, Apple prays for the following relief:

1. That judgment be entered in favor of Apple that the accused Defendants have infringed and are infringing the '343, '506, '540, '783, '870, '872, '255, '545, '621 and '110 patents in violation of 35 U.S.C. §271;

2. That judgment be entered in favor of Apple that the accused Defendants have infringed and are infringing the Apple trademarks;

3. That judgment be entered in favor of Apple that the accused Defendants have violated 15 U.S.C. §1125(a);

4. That Apple be granted an accounting of all damages sustained as a result of the accused Defendants' infringement of Apple's patents as herein alleged;

EXHIBIT A

(12) **United States Patent**
Fadell et al.

(10) **Patent No.:** **US 7,627,343 B2**
(45) **Date of Patent:** ***Dec. 1, 2009**

(54) **MEDIA PLAYER SYSTEM**

OTHER PUBLICATIONS

(75) Inventors: **Anthony M. Fadell**, Portola Valley, CA (US); **Stephen Paul Zadesky**, San Carlos, CA (US); **John Benjamin Filson**, Los Altos, CA (US)

Co-Pending U.S. Appl. No. 11/875,661; Co-Pending U.S. Appl. No. 12/238,278; Co-Pending U.S. Appl. No. 12/394,459; Co-Pending U.S. Appl. No. 12/418,439; Co-Pending U.S. Appl. No. 11/875,638.*

(Continued)

(73) Assignee: **Apple Inc.**, Cupertino, CA (US)

Primary Examiner—George Eng

Assistant Examiner—Brandon J Miller

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 427 days.

(74) *Attorney, Agent, or Firm*—Townsend and Townsend and Crew LLP

This patent is subject to a terminal disclaimer.

(57) **ABSTRACT**

(21) Appl. No.: **10/423,490**

(22) Filed: **Apr. 25, 2003**

(65) **Prior Publication Data**

US 2004/0224638 A1 Nov. 11, 2004

(51) **Int. Cl.**
H04R 25/00 (2006.01)

(52) **U.S. Cl.** **455/557**; 439/222; 439/660

(58) **Field of Classification Search** 455/557,
455/559, 556.1, 556.2, 3.03, 3.06, 41.3, 41.2,
455/414.1; 710/303, 304, 62, 72, 300, 64;
439/218, 638, 639, 660, 610, 222, 626; 381/384,
381/123

See application file for complete search history.

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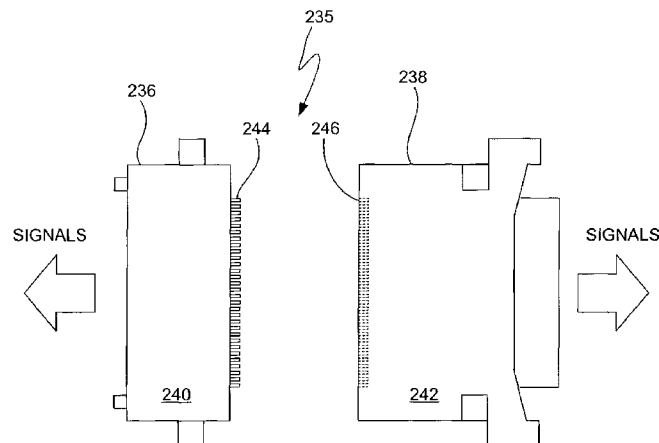
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(Continued)

A media player system is disclosed. One aspect of the media player system pertains to a docking station that allows a media player to communicate with other media devices. Another aspect of the media player system pertains to a wireless media player system that includes a hand held media player capable of transmitting information over a wireless connection and one or more media devices capable of receiving information over the wireless connection. Another aspect of the media player system pertains to a method of wirelessly connecting the hand held media player to another device. The method includes selecting a media item on the hand held media player; selecting one or more remote recipients on the hand held media player; and transmitting the media item locally to the hand held media player, and wirelessly to the selected remote recipients. Another aspect of the media player system pertains to a hand held music player that includes a transmitter for transmitting information over a wireless connection. The transmitter is configured to at least transmit a continuous music feed to one or more personal tuning devices that each include a receiver capable of receiving information from the transmitter over the wireless connection. Yet another aspect of the media player system pertains to a connector that includes a housing and a plurality of spatially separated contacts mounted within the housing. A first set of contacts are directed at a first functionality and a second set of contacts are directed at a second functionality that is different than the first functionality.

34 Claims, 16 Drawing Sheets



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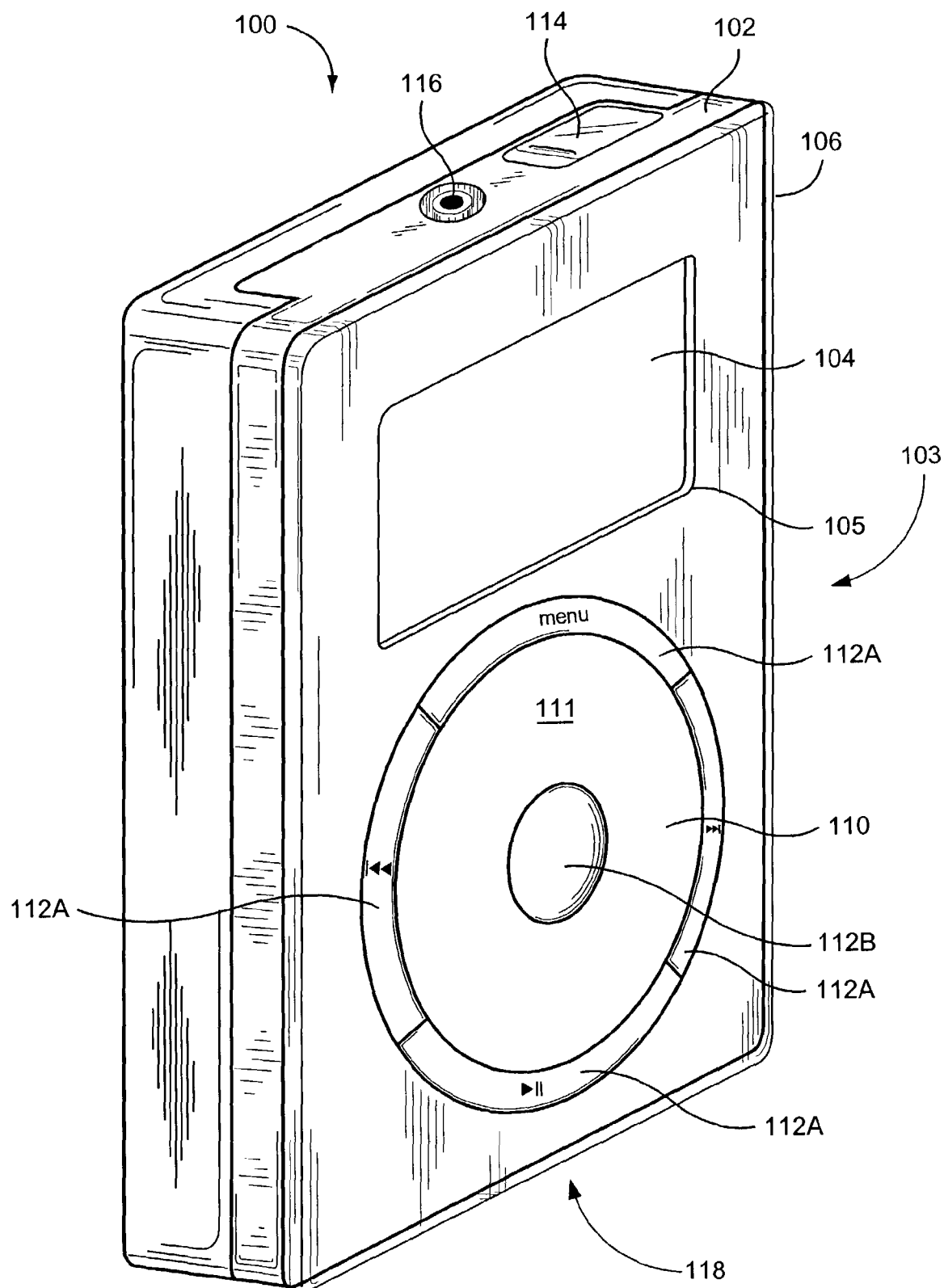


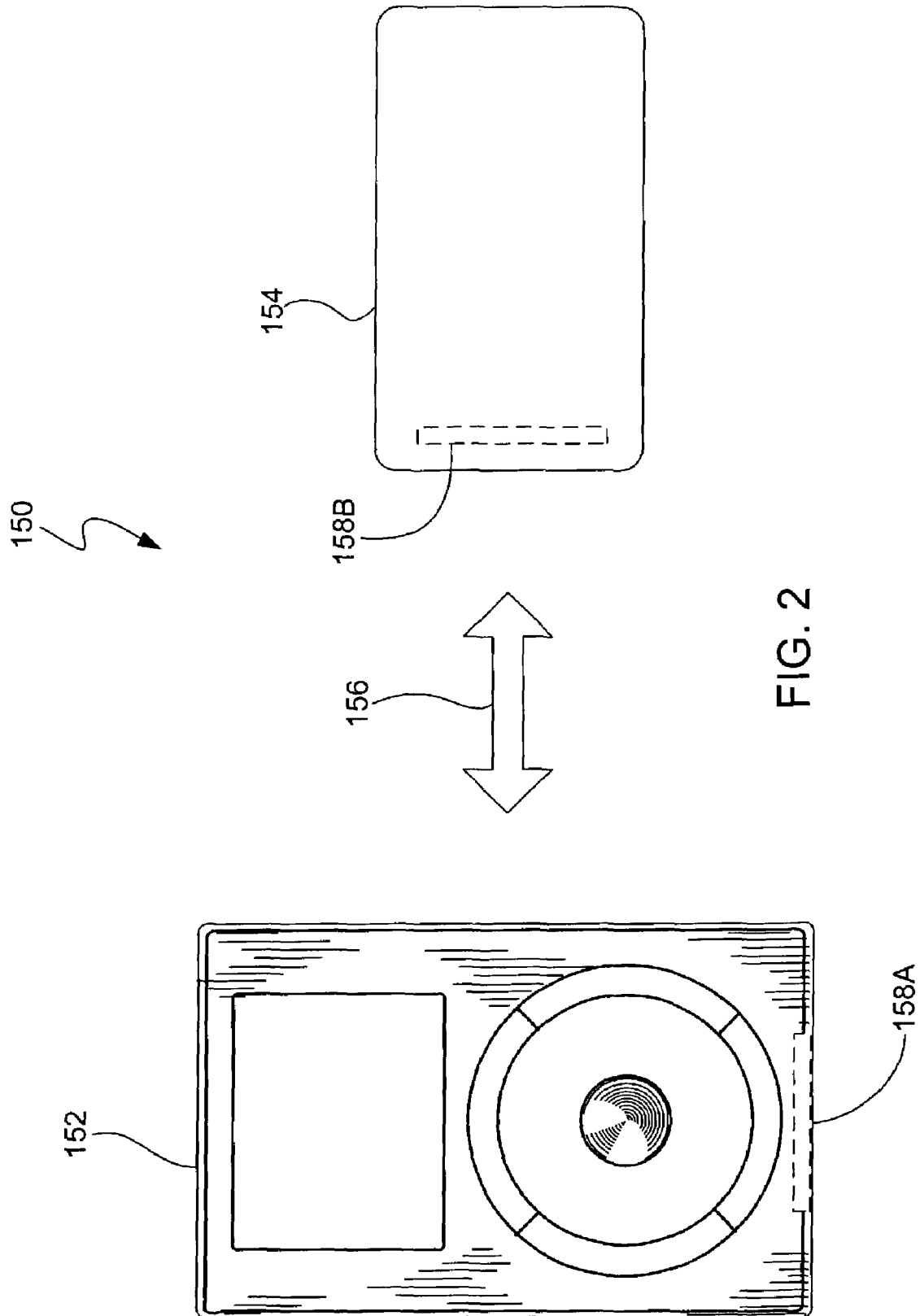
FIG. 1

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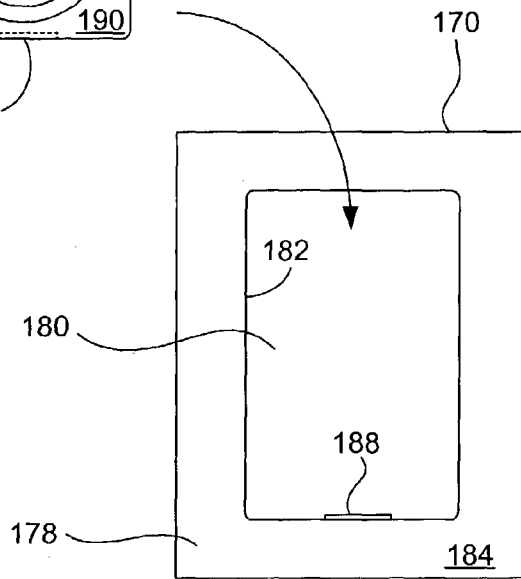
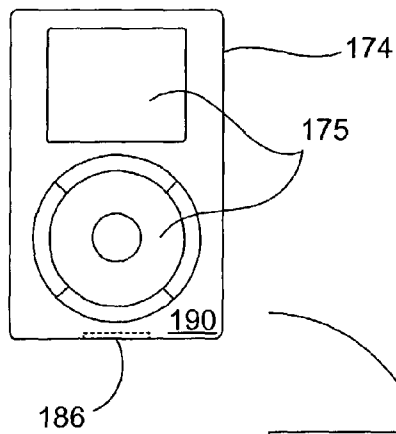


FIG. 3A

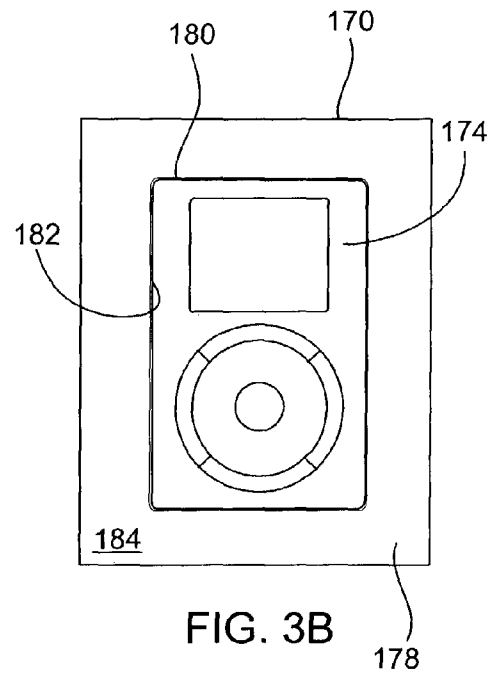


FIG. 3B

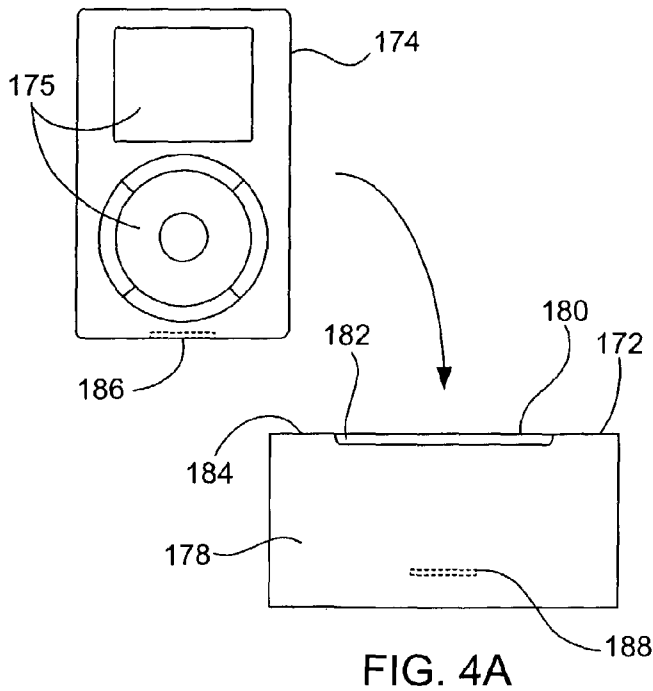


FIG. 4A

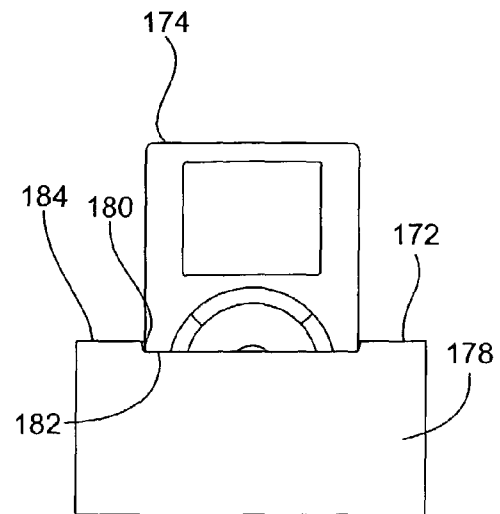


FIG. 4B

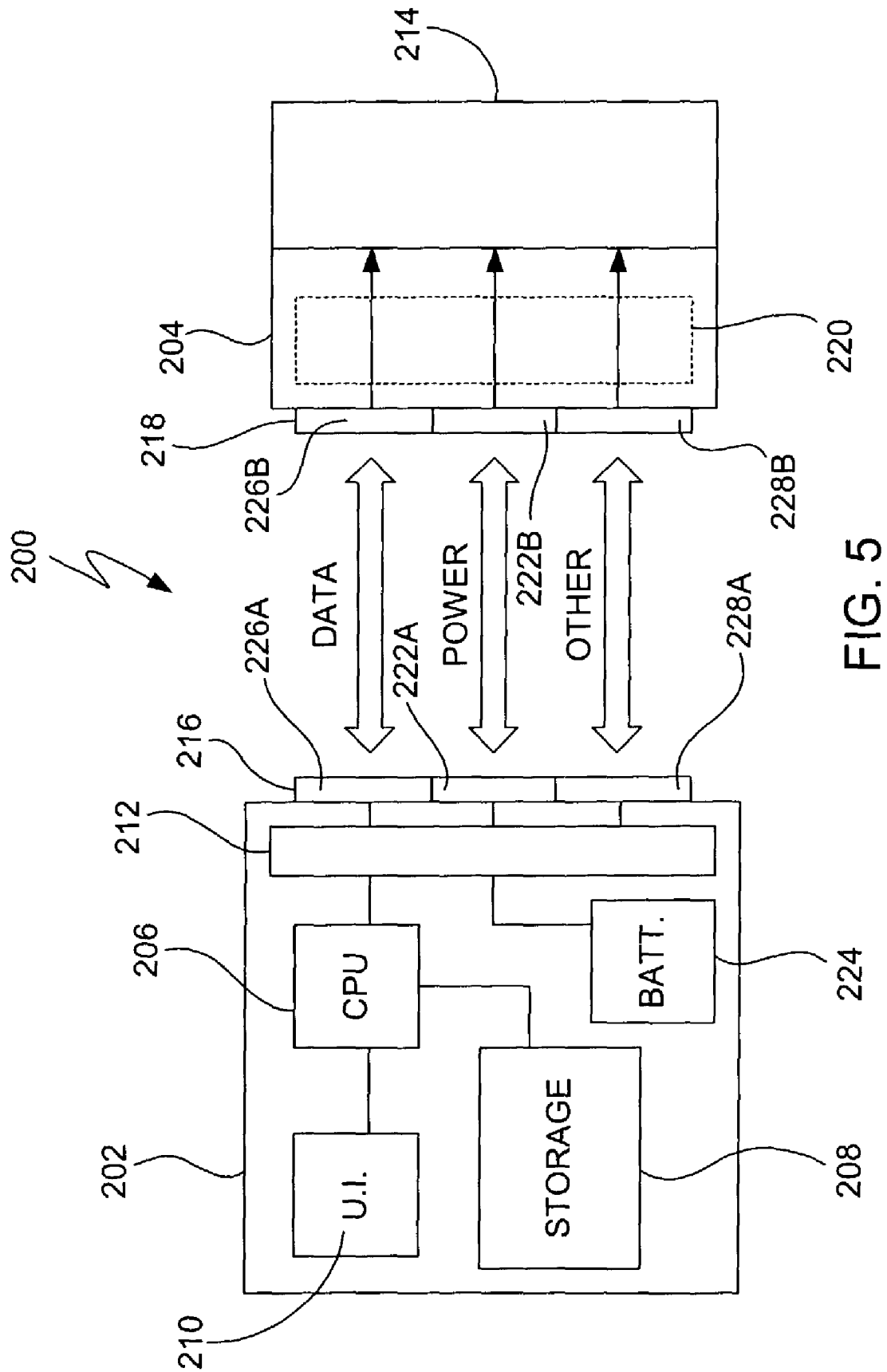


FIG. 5

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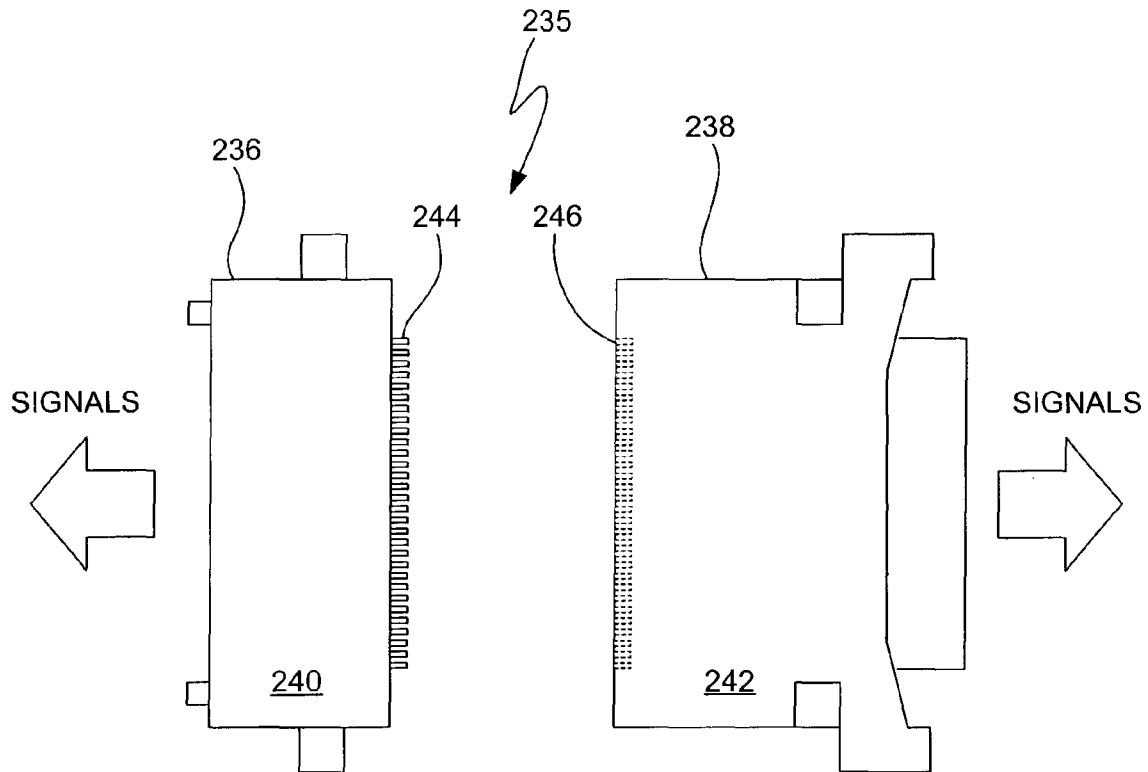


FIG. 6A

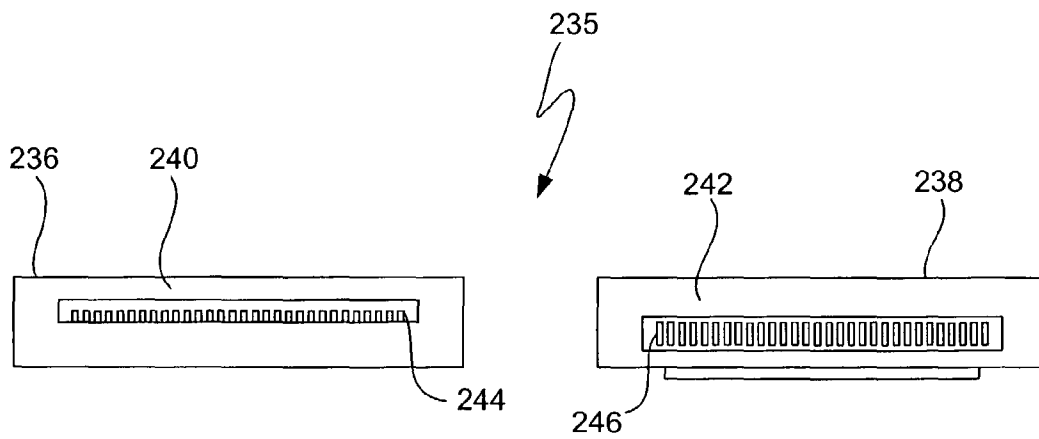
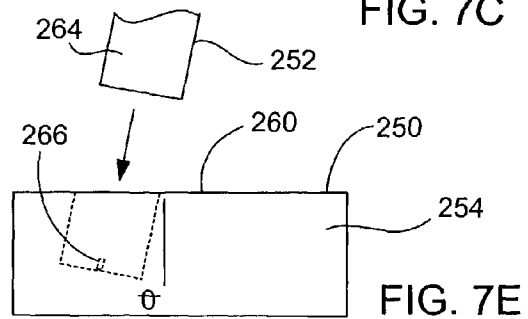
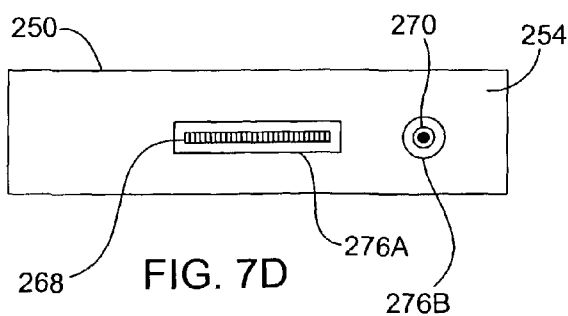
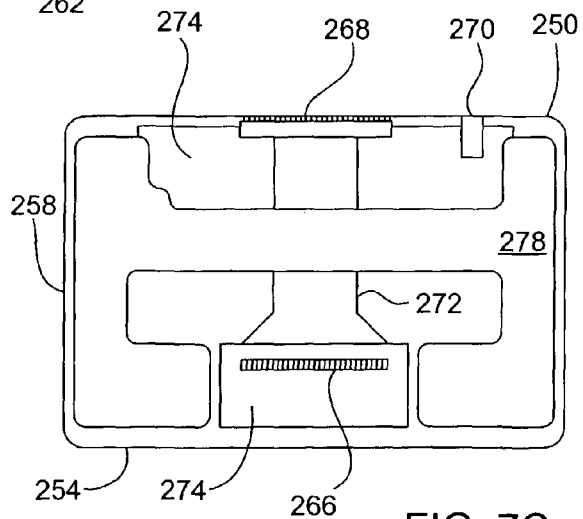
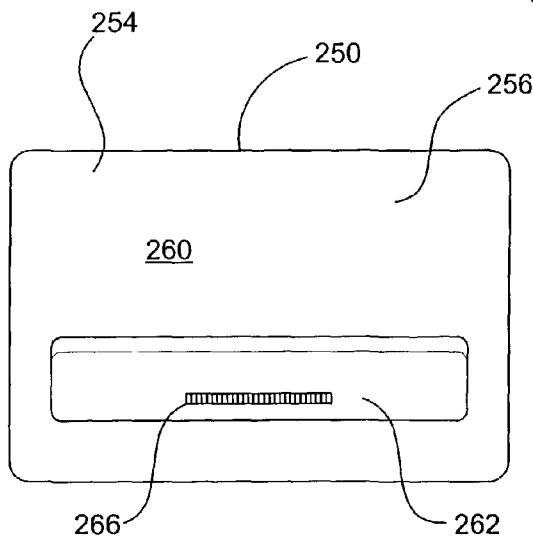
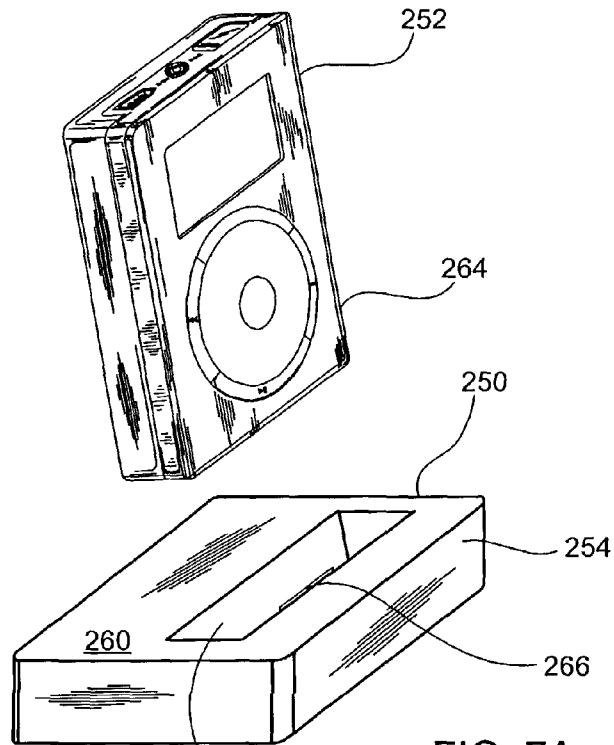


FIG. 6B

PIN DESIGNATION CHART

Pin#	Signal name	I/O	Function
1	F/W GND	Input	Firewire and charger ground
2	F/W GND	Input	Firewire and charger ground
3	TPA+	I/O	Firewire signal
4	USB D+	I/O	USB signal
5	TPA-	I/O	Firewire signal
6	USB D-	I/O	USB signal
7	TPB+	I/O	Firewire signal
8	USB PWR	Input	USB power in, this is not used for powering, but to detect a connection to a USB host
9	TPB-	I/O	Firewire signal
10	Accessory Identify	Input	Pull down in dock to notify media player of specific device
11	F/W PWR+	Input	Firewire and charger input power (8v to 30v dc)
12	F/W PWR+	Input	Firewire and charger input power (8v to 30v dc)
13	ACCESSORY PWR(3V3)	Output	3.3v output from media player, current limited to 100mA for powering accessories
14	Reserved		
15	USB GND	GND	Digital ground in media player
16	DGND	GND	Digital ground in media player
17	Reserved		
18	Dock Tx		Serial protocol (Data To media player)
19	Dock Rx		Serial protocol (Data From media player)
20	Accessory Detect	I/O	
21	Reserved		
22	Reserved		
23	Reserved		
24	Reserved		
25	LINE-IN L	Input	Line level input to the media player for the left channel
26	LINE-IN R	Input	Line level input to the media player for the right channel
27	LINE-OUT L	Output	Line level output to the media player for the left channel
28	LINE-OUT R	Output	Line level output to the media player for the right channel
29	Audio Return	GND	Audio return - Signal, never to be grounded inside accessory
30	DGND	GND	Digital ground in media player
31	Chassis		Chassis ground for connector shell
32	Chassis		Chassis ground for connector shell

FIG. 6C



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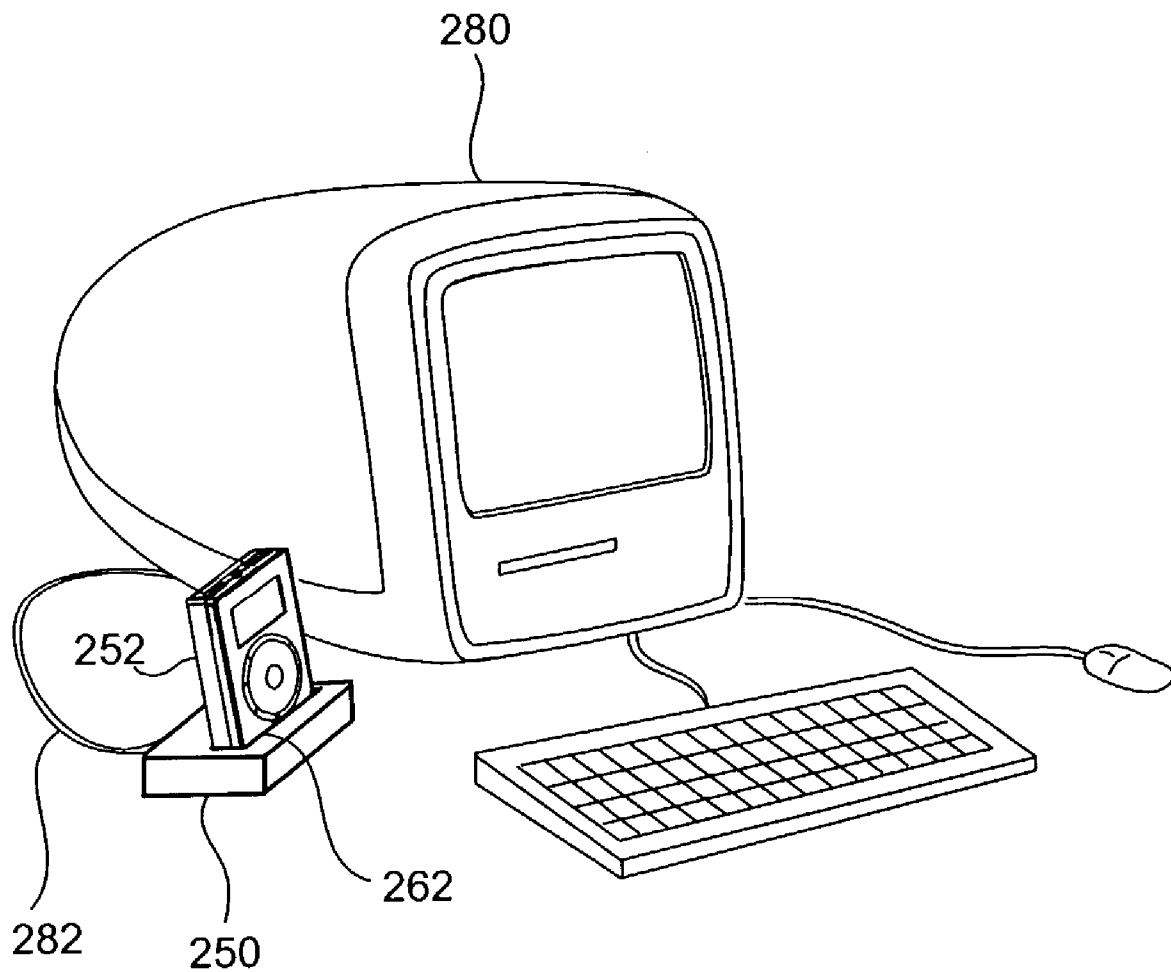


FIG. 8

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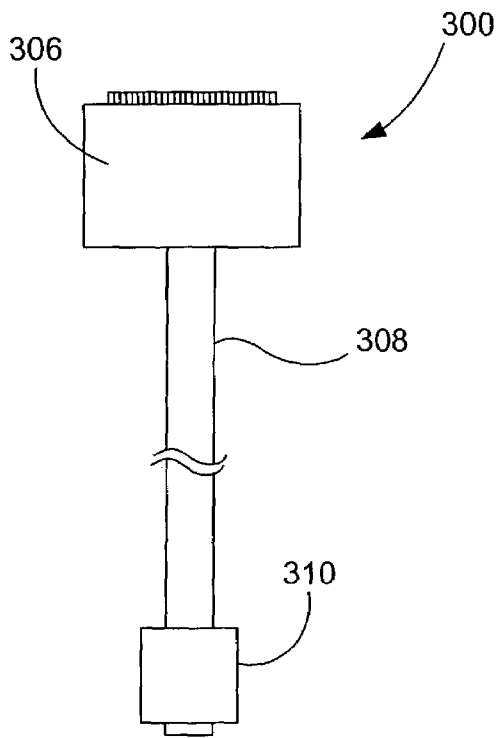


FIG. 9A

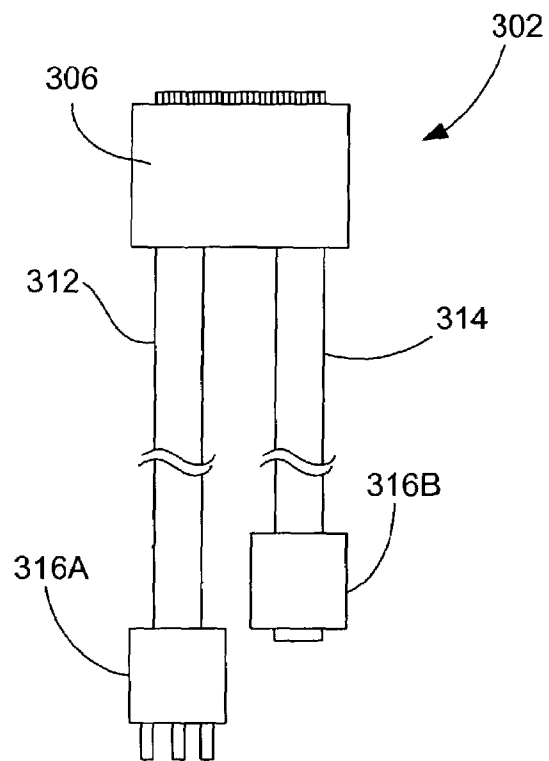


FIG. 9B

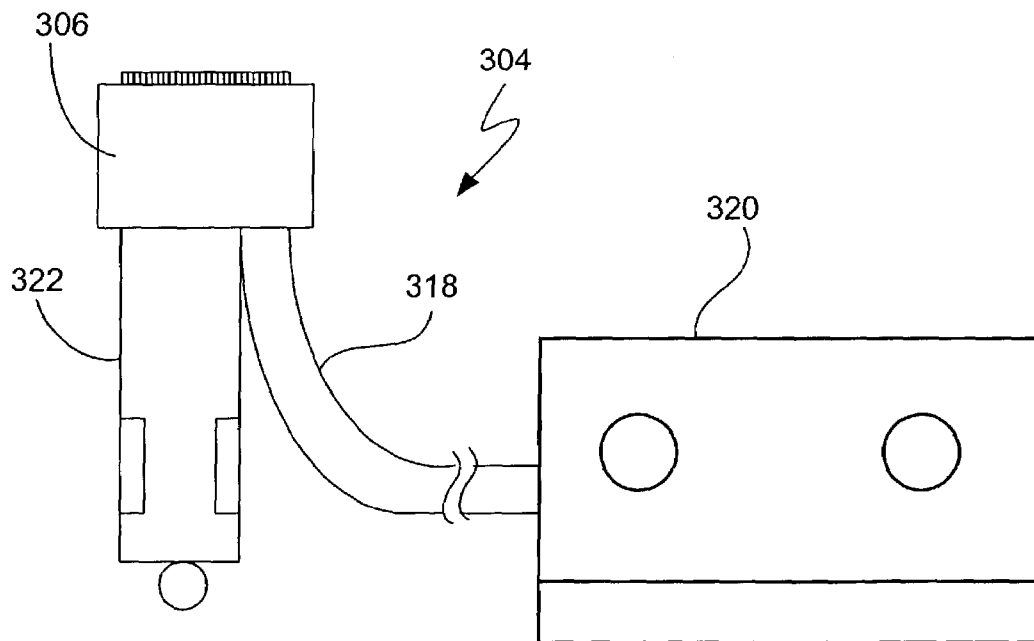


FIG. 9C

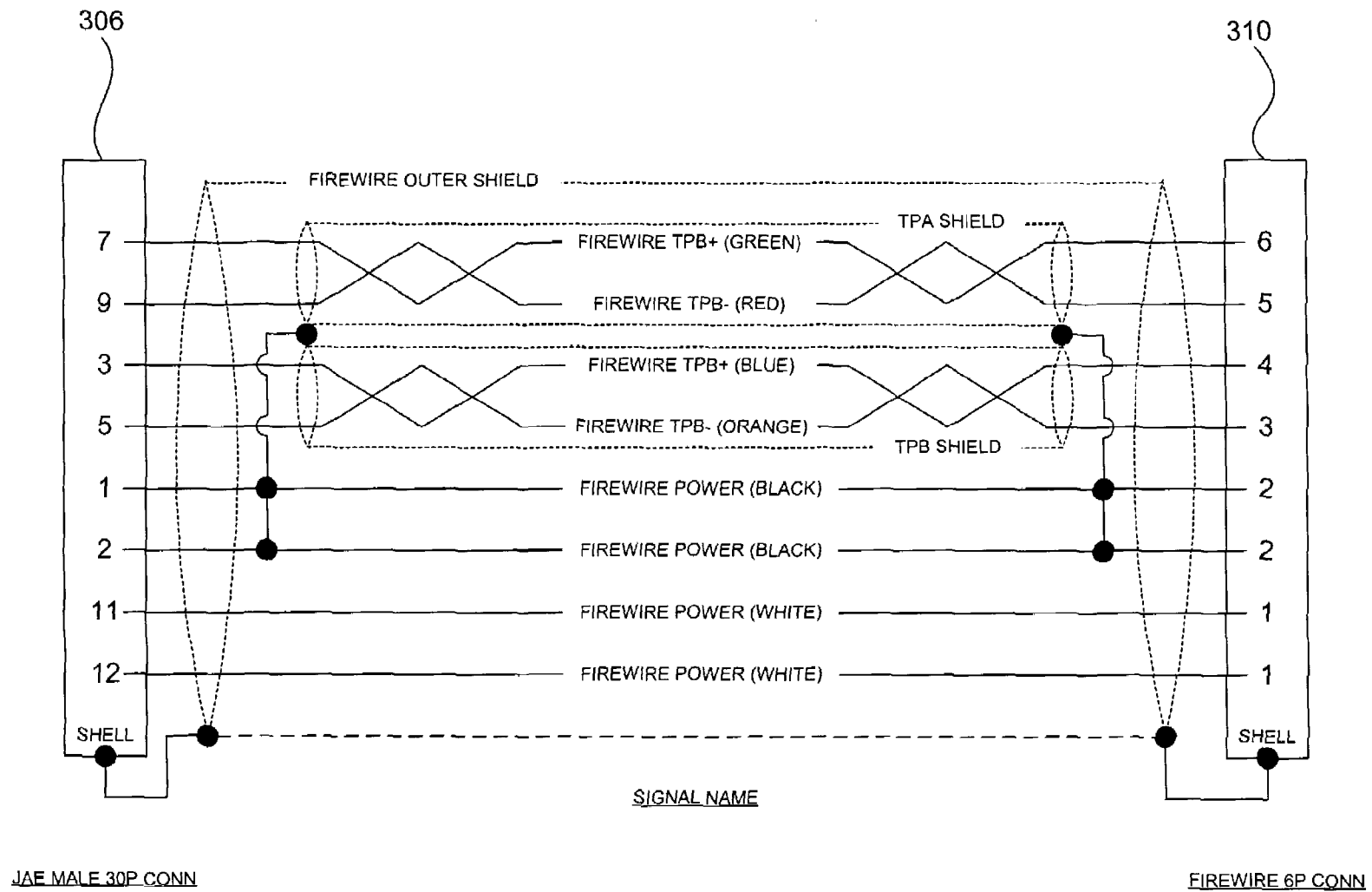


FIG. 9D

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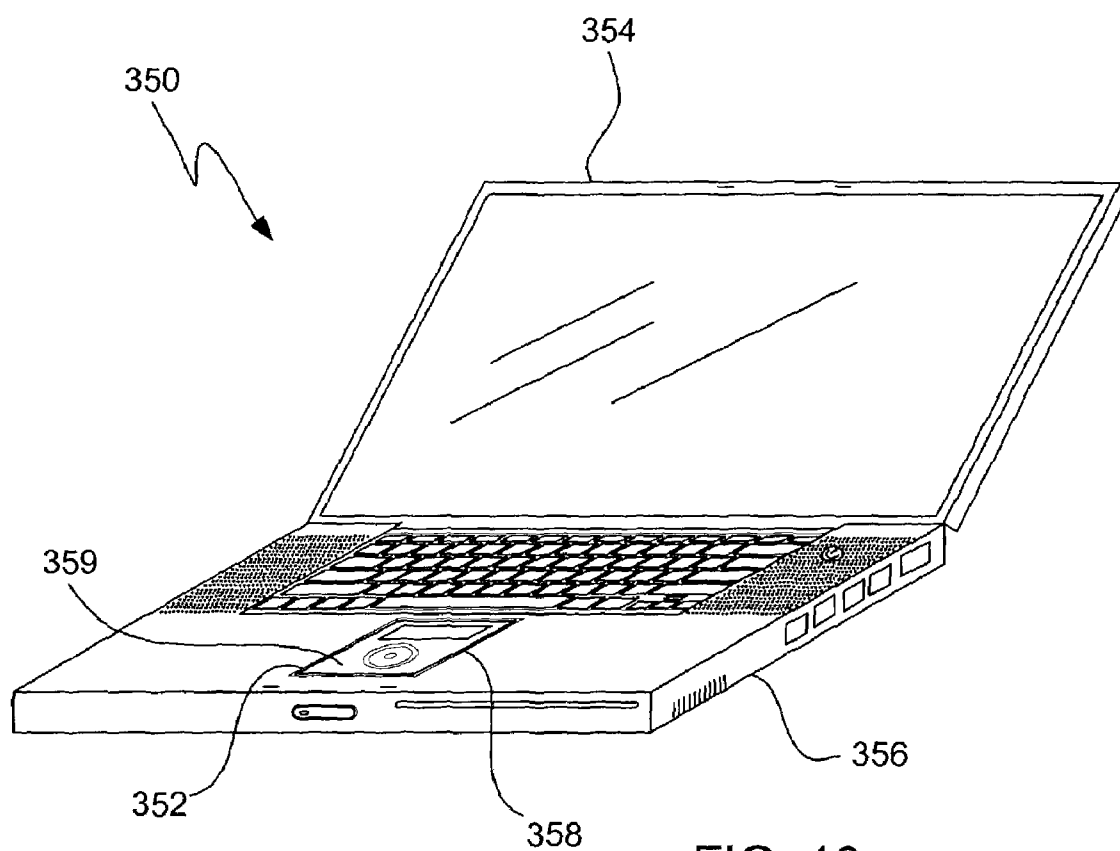


FIG. 10

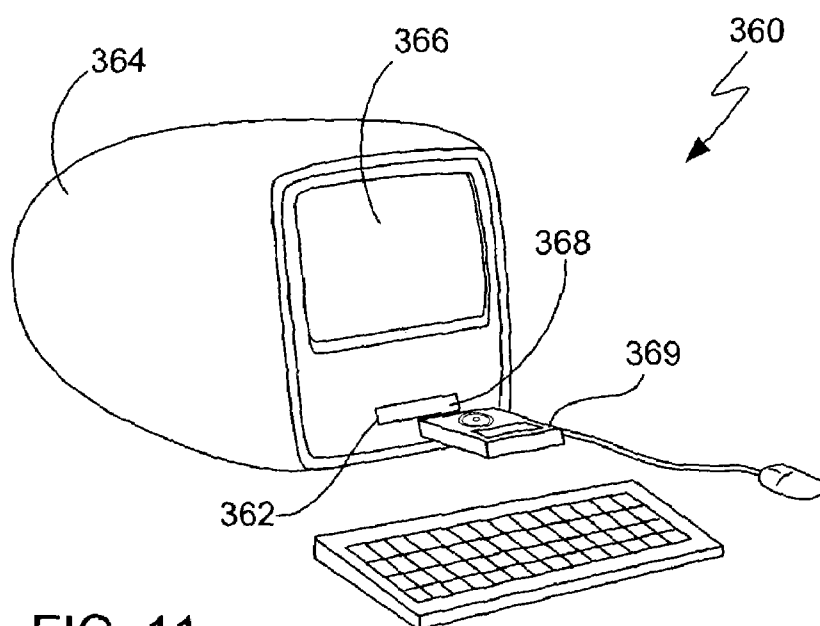


FIG. 11

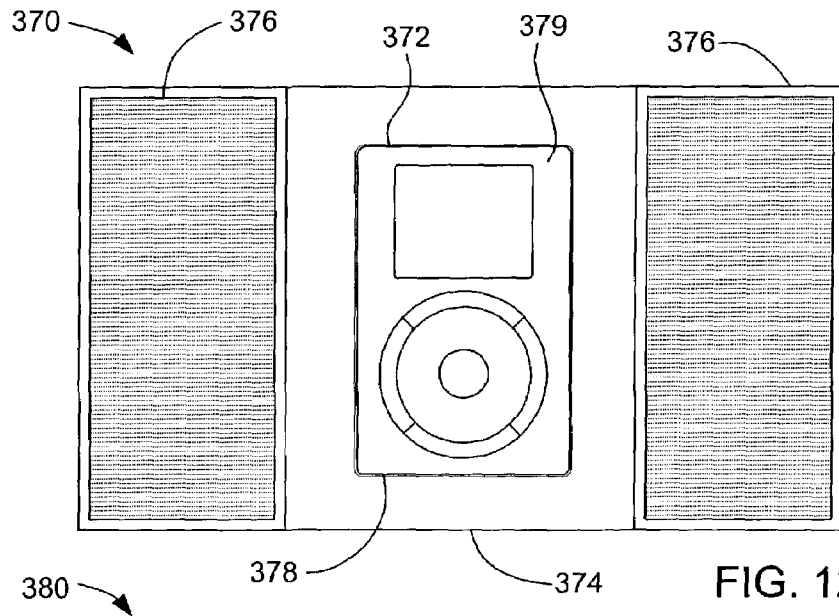


FIG. 12

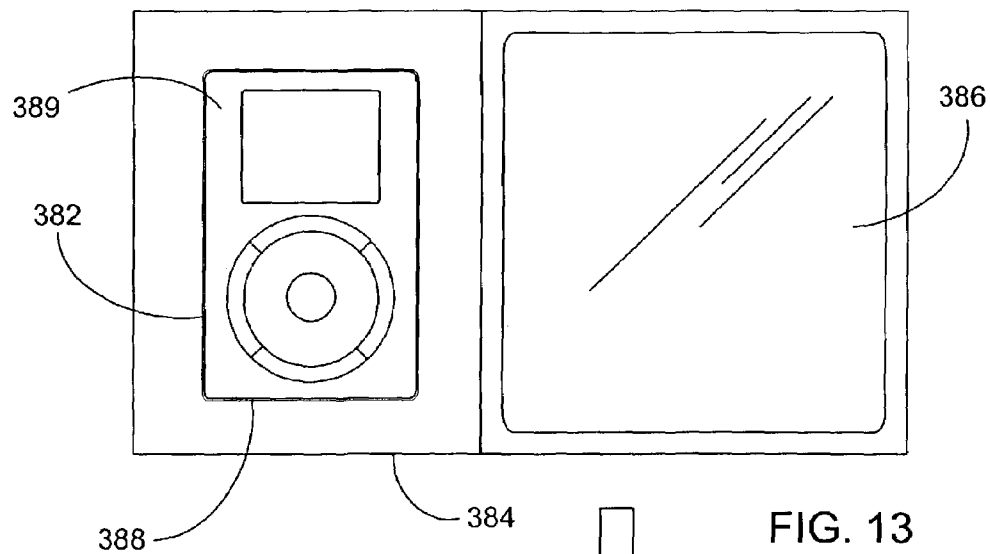


FIG. 13

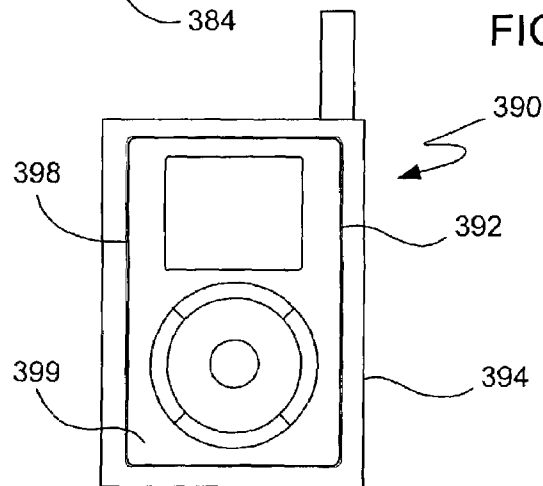


FIG. 14

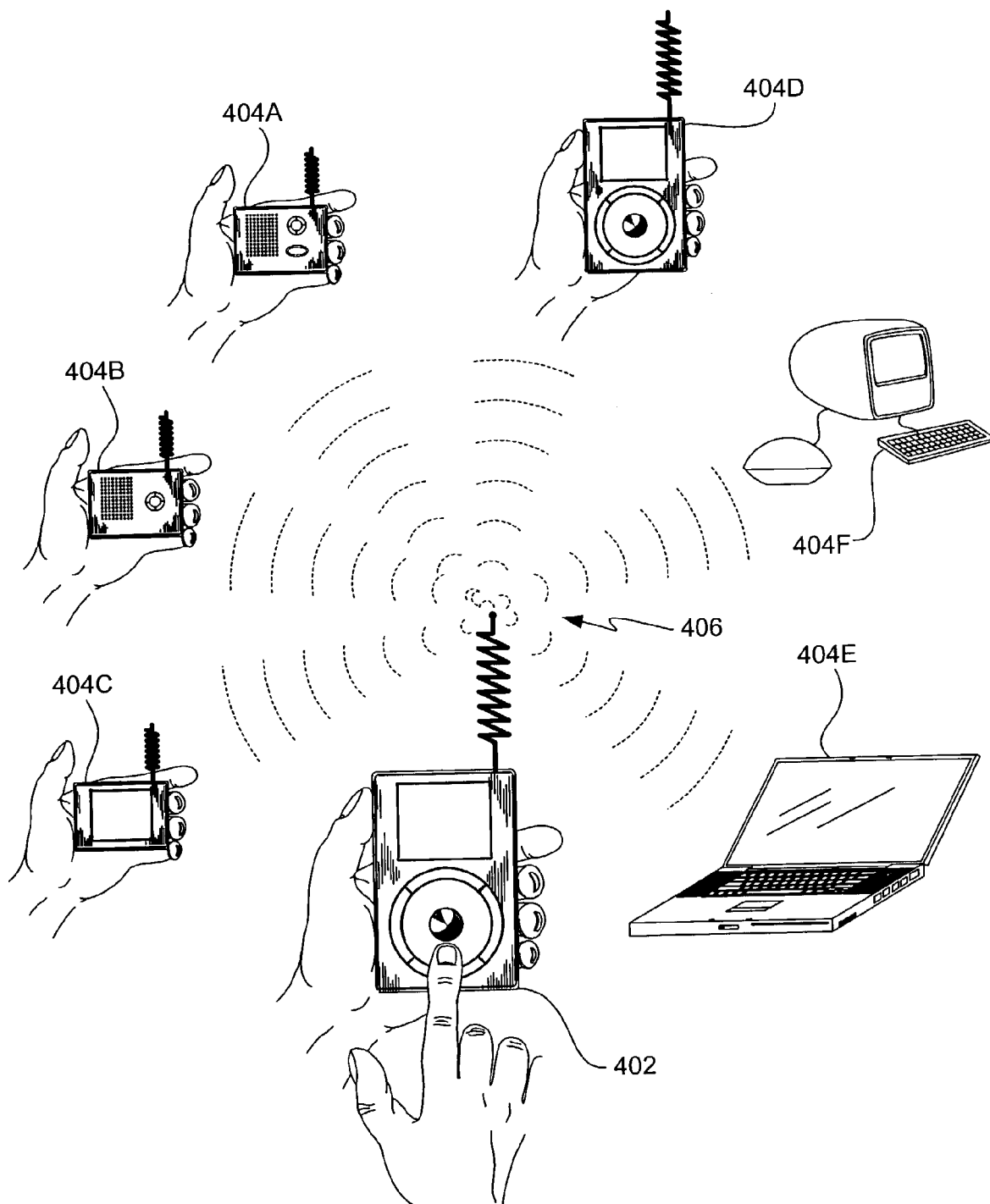


FIG. 15

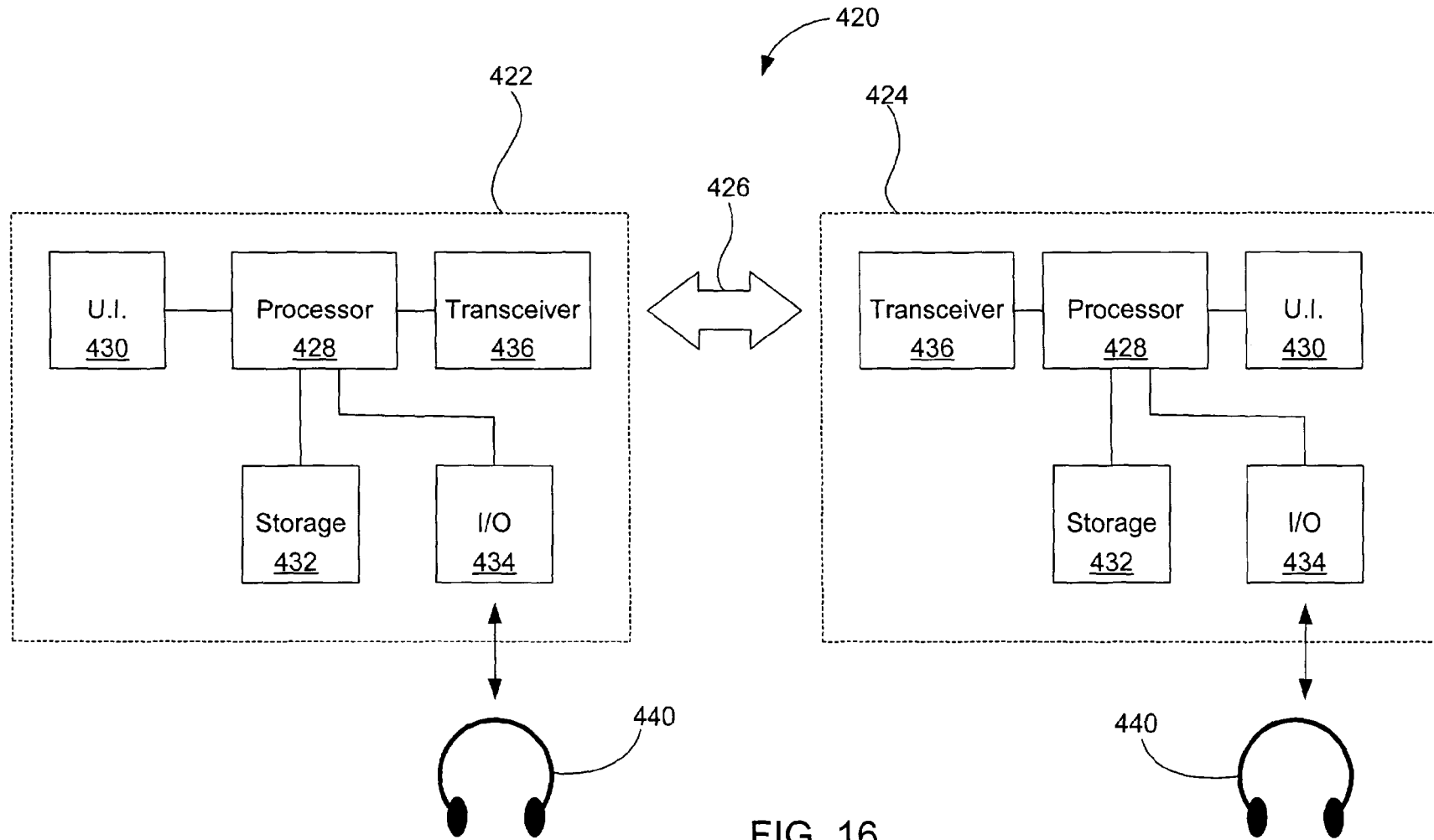


FIG. 16

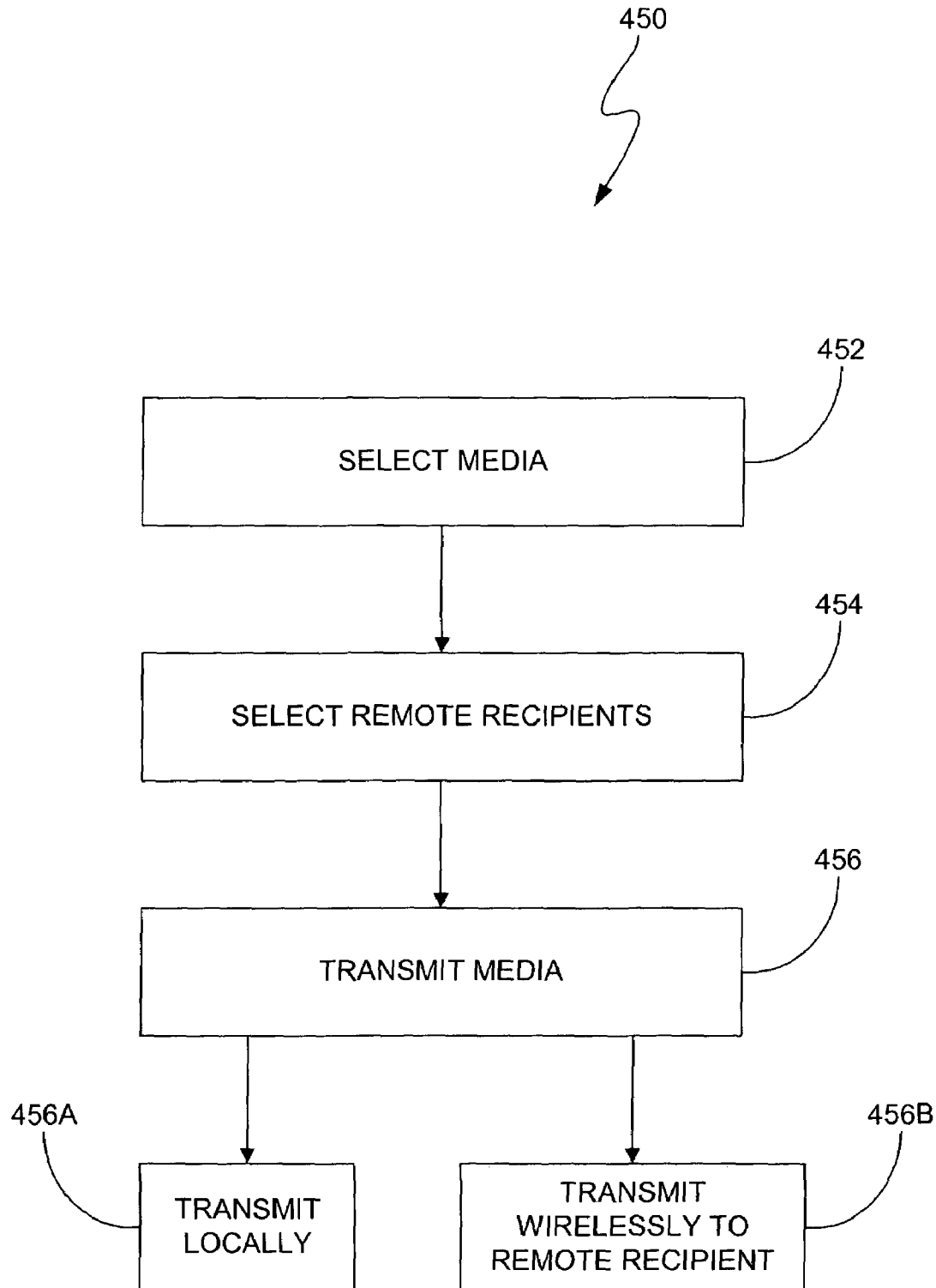


FIG. 17

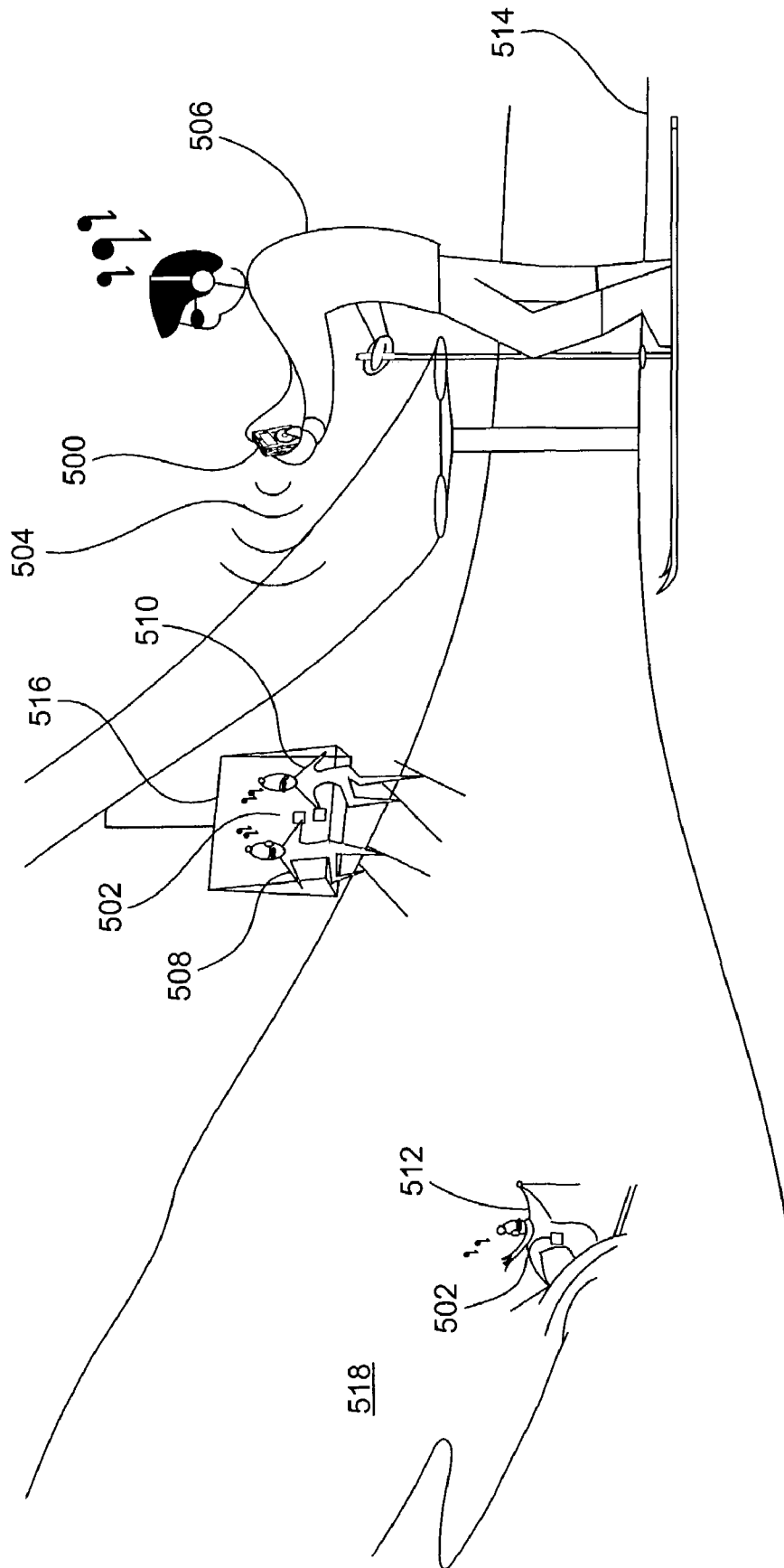


FIG. 18

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MEDIA PLAYER SYSTEM**BACKGROUND OF THE INVENTION****1. Field of the Invention**

The present invention relates generally to a media player. More particularly, the present invention relates to improved features for connecting the media player to external devices.

2. Description of the Related Art

The hand held consumer electronics market is exploding, and an increasing number of those products are including mechanism for expanding connections thereto. By way of example, hand held consumer electronic products may correspond to cellular phones, personal digital assistants (PDAs), video games, radios, MP3 players, CD players, DVD players, televisions, game players, cameras, etc. Most of these devices include some sort of connector for making connections to other devices (e.g., Firewire, USB, audio out, video in, etc.). Some of these devices have been capable of connections to other devices through docking stations. For example, cellular phones have included docking stations for charging the cellular phones and PDAs have included docking stations for communicating with a host computer. Other devices have been capable of wireless connections therebetween. For example, cellular phones use wireless connections to communicate back and forth (e.g., include wireless receivers).

MP3 music players in particular have typically made connections to other devices through connectors. For example, the MP3 music player known as the Ipod manufactured by Apple Computer of Cupertino, Calif. has included a Firewire connector for communicating with a computer. The Firewire connector through a cable connected to the computer generally allows data transmissions to travel back and forth between the MP3 music player and the computer. As should be appreciated, MP3 music players are configured to play MP3 formatted songs. These songs may be uploaded from the computer and thereafter stored in the MP3 player. As is generally well known, the MP3 format is a compression system for digital music that helps reduce the size of a digitized song without hurting the sound quality, i.e., compress a CD-quality song without losing the CD sound quality. By way of example, a 32 MB song on a CD may compress down to about a 3 MB song using the MP3 format. This generally lets a user download a song in minutes rather than hours.

Although current media players such as MP3 music players work well, there is a continuing need for improved features for connecting or coupling media players to one or more external devices (e.g., input or output).

SUMMARY OF THE INVENTION

The invention relates, in one embodiment, to a docking station that allows a media player to communicate with other media devices. The media player (e.g., music player) having a first media connector for connection to the docking station. The docking station includes a housing and a media bay disposed inside the housing. The media bay is capable of receiving the media player. The media bay includes a media bay opening and a second media connector. The media bay opening provides access to the media bay connector. The media bay connector is configured for removable engagement with the first media connector of the media player. The first and second media connectors are configured to allow data and power transmissions therethrough. The data transmission includes at least two data formats. The docking station also includes one or more outputs that are operatively coupled to

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the second media bay connector. The outputs are configured to allow at least data transmissions therethrough.

The invention relates, in another embodiment, to a wireless media player system. The wireless media player system includes a hand held media player (e.g., music player) capable of transmitting information over a wireless connection. The wireless media player system also includes one or more media devices (e.g., tuning devices) capable of receiving information over the wireless connection.

The invention relates, in another embodiment, to a method of wirelessly connecting a hand held media player to another device. The method includes selecting a media item on the hand held media player. The method also includes selecting one or more remote recipients on the hand held media player. The method further includes transmitting the media item locally to the hand held media player, and wirelessly to the selected remote recipients.

The invention relates, in another embodiment, to a hand held music player (e.g., MP3 player) that includes a transmitter for transmitting information over a wireless connection. The transmitter is configured to at least transmit a continuous music feed to one or more personal tuning devices that each include a receiver capable of receiving information from the transmitter over the wireless connection.

The invention relates, in yet another embodiment, to a connector for use in a media player system. The connector includes a housing and a plurality of spatially separated contacts mounted within the housing. A first set of contacts are appropriated for Firewire transmissions, a second set of contacts being appropriated for USB transmissions.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention is illustrated by way of example, and not by way of limitation, in the figures of the accompanying drawings and in which like reference numerals refer to similar elements and in which:

FIG. 1 is a perspective view of a media player, in accordance with one embodiment of the present invention.

FIG. 2 is a diagram of a media player system, in accordance with one embodiment of the present invention.

FIGS. 3A and 3B are diagrams of a docking station, in accordance with one embodiment of the present invention.

FIGS. 4A and 4B are diagrams of a docking station, in accordance with one embodiment of the present invention.

FIG. 5 is a block diagram of a media player system, in accordance with one embodiment of the present invention.

FIG. 6A is a top view of a connector assembly, in accordance with one embodiment of the present invention.

FIG. 6B is a front view of a connector assembly, in accordance with one embodiment of the present invention.

FIG. 6C is a pin designation chart, in accordance with one embodiment of the present invention.

FIG. 7A is a perspective diagram of a stand alone docking station, in accordance with one embodiment of the present invention.

FIG. 7B is a top view of a stand alone docking station, in accordance with one embodiment of the present invention.

FIG. 7C is a top view of a stand alone docking station with its cover removed, in accordance with one embodiment of the present invention.

FIG. 7D is a back view of a stand alone docking station, in accordance with one embodiment of the present invention.

FIG. 7E is a side view of a stand alone docking station, in accordance with one embodiment of the present invention.

FIG. 8 is a diagram of a media player docking station in use, in accordance with one embodiment of the invention.

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FIG. 9A is a diagram of a cable adapter, in accordance with one embodiment of the present invention.

FIG. 9B is a diagram of a cable adapter, in accordance with one embodiment of the present invention.

FIG. 9C is a diagram of a cable adapter, in accordance with one embodiment of the present invention.

FIG. 9D is a functional diagram of a cable adapter, in accordance with one embodiment of the present invention.

FIG. 10 is a diagram of a notebook computer with a built-in docking station, in accordance with another embodiment of the present invention.

FIG. 11 is a diagram of a desktop computer with a built-in docking station, in accordance with another embodiment of the present invention.

FIG. 12 is a diagram of a boom box with a built-in docking station, in accordance with another embodiment of the present invention.

FIG. 13 is a diagram of a photo frame with a built-in docking station, in accordance with another embodiment of the present invention.

FIG. 14 is a diagram of a family radio with a built-in docking station, in accordance with another embodiment of the present invention.

FIG. 15 is a diagram of a of a wireless communication system, in accordance with another embodiment of the present invention.

FIG. 16 is a block diagram of a of a wireless communication system, in accordance with another embodiment of the present invention.

FIG. 17 is a flow diagram of a wireless transmission method, in accordance with one embodiment of the present invention.

FIG. 18 is a perspective diagram of a wireless communication network in use, in accordance with another embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

The present invention will now be described in detail with reference to a few preferred embodiments thereof as illustrated in the accompanying drawings. In the following description, numerous specific details are set forth in order to provide a thorough understanding of the present invention. It will be apparent, however, to one skilled in the art, that the present invention may be practiced without some or all of these specific details. In other instances, well known process steps have not been described in detail in order not to unnecessarily obscure the present invention.

FIG. 1 is a perspective diagram of a media player 100, in accordance with one embodiment of the present invention. The term "media player" generally refers to computing devices that are dedicated to processing media such as audio, video or other images, as for example, music players, game players, video players, video recorders, cameras, and the like. In some cases, the media players contain single functionality (e.g., a media player dedicated to playing music) and in other cases the media players contain multiple functionality (e.g., a media player that plays music, displays video, stores pictures and the like). In either case, these devices are generally portable so as to allow a user to listen to music, play games or video, record video or take pictures wherever the user travels.

In one embodiment, the media player is a handheld device that is sized for placement into a pocket of the user. By being pocket sized, the user does not have to directly carry the device and therefore the device can be taken almost anywhere the user travels (e.g., the user is not limited by carrying a large, bulky and often heavy device, as in a laptop or notebook

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computer). For example, in the case of a music player, a user may use the device while working out at the gym. In case of a camera, a user may use the device while mountain climbing. In the case of a game player, the user can use the device while traveling in a car. Furthermore, the device may be operated by the users hands, no reference surface such as a desktop is needed. In the illustrated embodiment, the media player 100 is a pocket sized hand held MP3 music player that allows a user to store a large collection of music (e.g., in some cases up to 4,000 CD-quality songs). Although used primarily for storing and playing music, the MP3 music player shown herein may also include additional functionality such as storing a calendar and phone lists, storing and playing games, storing photos and the like. In fact, in some cases, it may act as a highly transportable storage device.

By way of example, the MP3 music player may correspond to the Ipod MP3 player manufactured by Apple Computer of Cupertino, Calif. The pocket sized Ipod has a width of about 2.4 inches, a height of about 4 inches and depths ranging from about 0.72 to about 0.84 inches.

As shown in FIG. 1, the media player 100 includes a housing 102 that encloses internally various electrical components (including integrated circuit chips and other circuitry) to provide computing operations for the media player 100. In addition, the housing may also define the shape or form of the media player. That is, the contour of the housing 102 may embody the outward physical appearance of the media player 100. The integrated circuit chips and other circuitry contained within the housing may include a microprocessor (e.g., CPU), memory (e.g., ROM, RAM), a power supply (e.g., battery), a circuit board, a hard drive, other memory (e.g., flash) and/or various input/output (I/O) support circuitry. The electrical components may also include components for inputting or outputting music or sound such as a microphone, amplifier and a digital signal processor (DSP). The electrical components may also include components for capturing images such as image sensors (e.g., charge coupled device (CCD) or complimentary oxide semiconductor (CMOS)) or optics (e.g., lenses, splitters, filters). The electrical components may also include components for sending and receiving media (e.g., antenna, receiver, transmitter, transceiver, etc.).

In the illustrated embodiment, the media player 100 includes a hard drive thereby giving the media player massive storage capacity. For example, a 20 GB hard drive can store up to 4000 songs or about 266 hours of music. In contrast, flash-based media players on average store up to 128 MB, or about two hours, of music. The hard drive capacity may be widely varied (e.g., 5, 10, 20 MB, etc.). In addition to the hard drive, the media player 100 shown herein also includes a battery such as a rechargeable lithium polymer battery. These type of batteries are capable of offering about 10 hours of continuous playtime to the media player.

The media player 100 also includes a user interface 103. The user interface 103 allows the user of the media player 100 to initiate actions on the media player 100 and provides the user with output associated with using the media player (e.g., audio, video, images, etc.). The user interface 103 may be widely varied. By way of example, the user interface 103 may include switches, buttons, keys, dials, trackballs, joysticks, touch pads, touch screens, displays, microphones, speakers, cameras, and the like.

In the illustrated embodiment, the media player 100 includes a display screen 104 and related circuitry. The display screen 104 is used to display a graphical user interface as well as other information to the user (e.g., text, objects, graphics). By way of example, the display screen 104 may be a

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liquid crystal display (LCD). In one particular embodiment, the display screen corresponds to a 160-by-128-pixel high-resolution display, with a white LED backlight to give clear visibility in daylight as well as low-light conditions. As shown, the display screen **104** is visible to a user of the media player **100** through an opening **105** in the housing **102**, and through a transparent wall **106** that is disposed in front of the opening **105**. Although transparent, the transparent wall **106** may be considered part of the housing **102** since it helps to define the shape or form of the media player **100**.

In addition to the display screen **104**, the media player **100** also includes a touch pad **110**. The touch pad is an intuitive interface that provides easy one-handed operation, i.e., lets a user interact with the media player with one or more fingers. The touch pad **110** is configured to provide one or more control functions for controlling various applications associated with the media player **100**. For example, the touch initiated control function may be used to move an object or perform an action on the display screen **104** or to make selections or issue commands associated with operating the media player **100**. In order to implement the touch initiated control function, the touch pad **110** may be arranged to receive input from a finger moving across the surface of the touch pad **110**, from a finger holding a particular position on the touch pad and/or by a finger tapping on a particular position of the touch pad. The touch pad may be widely varied. For example, the touch pad may be a conventional touch pad based on a Cartesian coordinate system, or the touch pad may be a touch pad based on a Polar coordinate system. Furthermore, the touch pad **110** may be used in a relative and/or absolute mode. In absolute mode, the touch pad **110** reports the absolute coordinates of where it is being touched. For example x, y in the case of the Cartesian coordinate system or (r, θ) in the case of the Polar coordinate system. In relative mode, the touch pad **110** reports the direction and/or distance of change. For example, left/right, up/down, and the like.

The touch pad **110** generally consists of a touchable outer surface **111** for receiving a finger for manipulation on the touch pad **110**. Although not shown in FIG. 1, beneath the touchable outer surface **111** is a sensor arrangement. The sensor arrangement includes a plurality of sensors that are configured to activate as the finger sits on, taps on or passes over them. In the simplest case, an electrical signal is produced each time the finger is positioned over a sensor. The number of signals in a given time frame may indicate location, direction, speed and acceleration of the finger on the touch pad, i.e., the more signals, the more the user moved his or her finger. In most cases, the signals are monitored by an electronic interface that converts the number, combination and frequency of the signals into location, direction, speed and acceleration information. This information may then be used by the media player **100** to perform the desired control function on the display screen **104**.

The position of the display screen **104** and touch pad **110** relative to the housing **102** may be widely varied. For example, they may be placed at any external surface (e.g., top, side, front, or back) of the housing **102** that is accessible to a user during manipulation of the media player **100**. In most cases, the touch sensitive surface **111** of the touch pad **110** is completely exposed to the user. In the illustrated embodiment, the touch pad **110** is located in a lower, front area of the housing **102**. Furthermore, the touch pad **110** may be recessed below, level with, or extend above the surface of the housing **102**. In the illustrated embodiment, the touch sensitive surface **111** of the touch pad **110** is substantially flush with the external surface of the housing **102**.

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The shape of the display screen **104** and the touch pad **110** may also be widely varied. For example, they may be circular, rectangular, triangular, and the like. In general, the outer perimeter of the shaped touch pad defines the working boundary of the touch pad. In the illustrated embodiment, the display screen is rectangular and the touch pad **110** is circular. More particularly, the touch pad is annular, i.e., shaped like or forming a ring. When annular, the inner and outer perimeter of the shaped touch pad defines the working boundary of the touch pad.

In addition to above, the media player **100** may also include one or more buttons **112**. The buttons **112** are configured to provide one or more dedicated control functions for making selections or issuing commands associated with operating the media player **100**. By way of example, in the case of an MP3 music player, the button functions may be associated with opening a menu, playing a song, fast forwarding a song, seeking through a menu and the like. In most cases, the button functions are implemented via a mechanical clicking action. The position of the buttons **112** relative to the touch pad **110** may be widely varied. For example, they may be adjacent one another or spaced apart. In the illustrated embodiment, the buttons **112** are configured to surround the inner and outer perimeter of the touch pad **110**. In this manner, the buttons **112** may provide tangible surfaces that define the outer boundaries of the touch pad **110**. As shown, there are four buttons **112A** that surround the outer perimeter and one button **112B** disposed in the center or middle of the touch pad **110**. By way of example, the plurality of buttons **112** may consist of a menu button, play/stop button, forward seek button and a reverse seek button, and the like.

Moreover, the media player **100** may also include a hold switch **114**. The hold switch **114** is configured to activate or deactivate the touch pad and/or buttons. This is generally done to prevent unwanted commands by the touch pad and/or buttons, as for example, when the media player is stored inside a user's pocket. When deactivated, signals from the buttons and/or touch pad are not sent or are disregarded by the media player. When activated, signals from the buttons and/or touch pad are sent and therefore received and processed by the media player.

The media player **100** may also include one or more connectors for receiving and transmitting data to and from the media player. By way of example, the media player may include one or more audio jacks, video jacks, data ports and the like. The media player **100** may also include one or more connectors for receiving and transmitting power to and from the media player **100**.

In the illustrated embodiment, the media player includes a headphone jack **116** and a data port **118**. The headphone jack **116** is capable of receiving a headphone or speaker plug associated with headphones/speakers configured for listening to sound being outputted by the media device **100**. The data port **118**, on the other hand, is capable of receiving a data plug/cable assembly configured for transmitting and receiving data to and from a host device such as a general purpose computer (e.g., desktop computer, portable computer). By way of example, the data port **118** may be used to upload or download audio, video and other images to and from the media device **100**. For example, the data port may be used to download songs and play lists, audio books, ebooks, photos, and the like into the storage mechanism of the media player.

The data port **118** may be widely varied. For example, the data port may be a PS/2 port, a serial port, a parallel port, network interface port, a USB port, a Firewire port and/or the like. In some cases, the data port **118** may be a wireless link such as a radio frequency (RF) link or an optical infrared (IR)

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link in order to eliminate the need for a cable. Although not shown in FIG. 1, the media player **100** may also include a power port that receives a power plug/cable assembly configured for delivering power to the media player **100**. In some cases, the data port **118** may serve as both a data and power port.

Although only one data port is provided, it should be noted that this is not a limitation and that multiple data ports may be incorporated into the media player. In a similar vein, the data port may include multiple data functionality, i.e., integrating the functionality of multiple data ports into a single data port. Furthermore, it should be noted that the position of the hold switch, headphone jack and data port on the housing may be widely varied. That is, they are not limited to the positions shown in FIG. 1. They may be positioned almost anywhere on the housing (e.g., front, back, sides, top, bottom). For example, the data port may be positioned on the top, sides, back, front surfaces of the housing rather than the bottom surface as shown. Although it should be noted that having the data port on the bottom surface provides some benefits when connecting to other devices.

FIG. 2 is a diagram of a media player system **150**, in accordance with one embodiment of the present invention. The media player system comprises a media player **152** and one or more media devices **154** that are connected via a media link **156**. As mentioned above, the term "media player" generally refers to computing devices that are dedicated to processing media such as audio, video or other images, as for example, music players, game players, video players, video recorders, cameras, and the like. By way of example, the media player **152** may correspond to the media player **100** shown in FIG. 1. Media devices **154** are similar to the media player **152** in that they process media such as audio, video or other images. The media devices may be widely varied. By way of example, the media devices may correspond to other media players, desktop computers, notebook computers, personal digital assistants, video or imaging equipment (e.g., cameras, monitors), audio equipment (home stereos, car stereos, boom boxes), family radios (e.g., walkie talkies), peripheral devices (e.g., keyboards, mice, displays, printers, scanners), personal media devices (discussed in greater detail below) and the like.

The media devices **154** and the media player **152** are configured to communicate with one another through media link **156**. The protocol under which they communicate may be widely varied. By way of example, the communication protocol may be a master/slave communication protocol, server/client communication protocol, peer/peer communication protocol, and the like. Using a master/slave communication protocol, one of the devices is a master and the other is a slave. The master controls the slave. Using a client/server communication protocol, a server program responds to requests from a client program. The server program may operate on the media player or the media device. Using a peer to peer communication protocol either of the two devices can initiate a communication session.

The media link **156** may be wired and/or wireless. For example, the media link **156** may be made through connectors and ports or through receivers, transmitters and/or transceivers. The media link may also be one way or two way. For example, in the case of one way, the media player may be configured to transmit signals to the media device but not to receive information from the media device (or vice versa) or in the case of two way, both the media player and media device may be enabled to receive and transmit signals therebetween. The signals may be data (analog, digital), power

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(AC, DC), and/or the like. In most cases, the data corresponds to data associated with the media player as for example audio, video, images and the like.

Both the media player **152** and the media device **154** include a media terminal **158A** and **158B**, respectively. The media terminals **158** may provide a direct connection between the media player **152** and the media device **154** (e.g., integrally formed with the media device) or it may provide an indirect connection between the media player **152** and the media device **154** (e.g., a stand alone device). The media terminals **158** provide the media link **156** through one or more connection interfaces. As such, the media player **152** may serve the media devices **154** and/or the media devices **154** may serve the media player **152**. The connection interfaces associated with the media terminals **158** may be wired or wireless connection interfaces.

In wired connections, the media terminals **158** are configured to physically connect so as to operatively couple the media player **152** to the media device **154**. For example, the media player **152** and the media device **154** may include a mating connection made up of connector and port. By way of example, the connection interface may include one or more of the following interfaces: PS/2, serial, parallel, network (e.g., Ethernet), USB, Firewire and/or the like. The connection interface may also include one or more remote, audio (digital or analog), video (digital or analog), and/or charging interfaces. In one embodiment, the media terminal **158B** is a part of docking station that permits the media player **152** to connect with the media device **154**. The docking station may be integrally formed with the media device **154** thereby providing a direction connection with the media player **152** or it may be a standalone device that provides an indirect connection between the media player **154** and the media device **152**.

In wireless connections, the media terminals **158** do not physically connect. For example, the media player **152** and the media device **154** may include a receiver and transmitter for wireless communications therebetween. By way of example, the connection interface may include one or more of the following interfaces: FM, RF, Bluetooth, 802.11 UWB (ultra wide band), IR, magnetic link (induction) and/or the like.

In brief, FM (frequency modulation) is a method of impressing data onto an alternating-current (AC) wave by varying the instantaneous frequency of the wave. This scheme can be used with analog or digital data. RF generally refers to alternating current AC having characteristics such that, if the current is input to an antenna, an electromagnetic field is generated suitable for wireless broadcasting and/or communications. The frequencies associated with RF cover a wide range of the electromagnetic radiation spectrum as for example from about 9 kHz to thousands of GHz. Bluetooth generally refers to a computing and telecommunications industry specification that describes how mobile phones, computers and personal digital assistants can easily interconnect with each other using short range wireless connection. 802.11 generally refers to a family of specification for wireless local area networks (WLANs) developed by a working group of the Institute of Electrical and Electronics Engineers (IEEE). UWB refers to a wireless technology for transmitting large amounts of digital data over a wide spectrum of frequency bands with very low power for a short distance. IR generally refers wireless technologies that convey data through infrared radiation.

FIGS. 3 and 4 are diagrams of docking stations **170** and **172**, respectively, in accordance with several embodiment of the present invention. The docking stations **170** and **172** are hardware components that include a set of connection inter-

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faces that allow a media player **174** to communicate with other media devices (not shown) that are not usually taken along with the media player **174**. That is, the docking stations **170** and **172** make available additional functionality that would not otherwise be achieved through the media player **174** and/or the other media devices. The docking stations **170** and **172** may be built into the media device (e.g., hard wired) or they may be stand-alone devices that are connected to the media device through a separate connection (e.g., cord). By way of example, the media player **174** may generally correspond to the media player shown in FIG. 1.

As shown, each of the docking stations includes a housing **178**. The housings **178** are configured with a media bay **180** capable of receiving the media player **174** for direct or indirect connection to a media device. The media bay **180** includes a media bay opening **182** in the surface **184** of the housing **178**. The media bay opening **182** is configured to physically receive the media player **174**. In other words, the media player **174** can be inserted into the media bay opening **182**. Once the media player **174** is inserted into the media bay opening **182** (as shown in FIGS. 3B and 4B), the functionality provided by a media device operatively coupled to the docking stations **170** and **172** becomes available for use by the media player **174**. Additionally or alternatively, the functionality provided by the media player **174** may become available for use by the media device operatively coupled to the docking stations **170** and **172**. In most cases, a connector **186** of the media player **174** couples to a corresponding connector **188** within the media bay **180** when the media player **174** is placed in the inserted position. The media player **180** essentially becomes a fixed location device when coupled to the docking stations **170** and **172** through the media bay **180** (unless the docking station happens to be in another mobile device). When the media player **174** is taken out, it becomes mobile again. As should be appreciated, the docking stations **172** and **174** let a user simultaneously enjoy expansion possibilities with the portability of a smaller device.

The media bays **180** of the docking stations **170** and **172** may be widely varied. In most cases, the media bay openings **182** are dimensioned to receive the media players **174**. That is, the inner peripheral surfaces of the media bay openings **182** are sized to receive the outer peripheral surfaces of the media player **174** (allowing for some tolerances). In FIG. 3, the media bay **180** is configured to receive the back end of the media player **174** while in FIG. 4 the media bay **180** is configured to receive a bottom end of the media player **174**. In either case, the connector **186** on the media player **174** is configured to connect with the connector **188** on the docking station **170** and **172** when the media player **174** is inserted in the media bay **180**. The position of the inserted media player **174** relative to the housing **178** may be widely varied. For example, the media bay **180** may be configured to receive the entire media player **174** as shown in FIG. 3 or it may only be configured to receive a portion of the media player **174** as shown in FIG. 4.

The inserted media player **174** is typically retained within the media bay **180** until it is removed from the media bay **180** (e.g., doesn't slide out). For example, a retention mechanism such as a snap, a spring loaded latch or a magnet may be used to hold the media player **174** within the media bay opening **182**. The media player **174** may also be held within the opening **182** by the force of the engaged connectors **186/188** or under its own weight (e.g., gravity). An ejection mechanism may additionally be used to release the media player **174** from the media bay **180** (e.g., to overcome any holding forces). In some cases (as shown in FIG. 3), the user interface **175** of the media player **174** is completely exposed to the user

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so that it is accessible to a user while inserted in the media bay **180**. In cases such as these, the user interface **175** (e.g., front surface of the media player) may be recessed below, level with, or extend above the external surface of the housing **178**. In the illustrated embodiment of FIG. 3, the front surface **190** of the media player **174** is substantially flush with the external surface **184** of the housing **178**.

FIG. 5 is a block diagram of a media player/docking station system **200**, in accordance with one embodiment of the present invention. The system **200** generally includes a media player **202** and a docking station **204**. By way of example, the media player and docking station may correspond to the media player and docking station shown in FIGS. 3 and 4. As shown, the media player **202** includes a processor **206** (e.g., CPU or microprocessor) configured to execute instructions and to carry out operations associated with the media player **202**. For example, using instructions retrieved for example from memory, the processor **206** may control the reception and manipulation of input and output data between components of the media player **202**. In most cases, the processor **206** executes instruction under the control of an operating system or other software. The processor **206** can be a single-chip processor or can be implemented with multiple components.

In most cases, the processor **206** together with an operating system operates to execute computer code and produce and use data. The computer code and data may reside within a program storage block **208** that is operatively coupled to the processor **206**. Program storage block **208** generally provides a place to hold data that is being used by the system **200**. By way of example, the program storage block **208** may include Read-Only Memory (ROM), Random-Access Memory (RAM), hard disk drive, flash memory and/or the like. As is generally well known, RAM is used by the processor as a general storage area and as scratch-pad memory, and can also be used to store input data and processed data. ROM can be used to store instructions or program code followed by the processor as well as other data. Hard disk drives can be used to store various types of data and can permit fast access to large amounts of stored data. The computer code and data could also reside on a removable program medium and loaded or installed onto the computer system when needed.

In one embodiment, program storage block **208** is configured to store an audio program for controlling the distribution of audio in the media player **202**. The audio program may contain song lists associated with songs also stored in the storage block **208**. The songs may be accessed through a user interface **210** operatively coupled to the processor **206**. The user interface **210** may include a display for visually displaying the song lists (as part of a GUI interface) and a touch pad or buttons for selecting a song to be played or reviewing and/or customizing the song lists, i.e., the user may quickly and conveniently review the lists and make changes or selections thereto.

The media player also includes an input/output (I/O) controller **212** that is operatively coupled to the processor **206**. The (I/O) controller **212** may be integrated with the processor **206** or it may be a separate component as shown. The I/O controller **212** is generally configured to control interactions with one or more media devices **214** that can be coupled to the media player **202**. The I/O controller **212** generally operates by exchanging data (and/or power) between the media player **202** and the media devices **214** that desire to communicate with the media player **202**. In some cases, the media devices **214** may be connected to the I/O controller **212** through wired connections and in other cases the media devices **214** may be connected to the I/O controller **212** through wireless connections.

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tions. In the illustrated embodiment, the media device **214** is capable of being connected to the I/O controller **212** through a wired connection.

The media player **202** also includes a connector **216** capable of connecting to a corresponding connector **218** located within the docking station **204**. The docking station **204** is operatively coupled to the media device **214** through transfer circuitry **220**. The transfer circuitry **220** may provide a direct or indirect link to the media device **214**. For example, the transfer circuitry **220** may be hard wired to the media device **214** as for example when the docking station **204** is integrated with the media device **214** or it may be passively wired as through a cord that temporarily plugs into the media device **214**.

The connector arrangement **216/218** used to connect the media player **202** and the docking station **204** may be widely varied. However, in the illustrated embodiment, the connector arrangement **216/218** includes both power and data contacts. The power contacts **222** of the media player **202** are operatively coupled to a battery **224** of the media player **202** and the data contacts **226** of the media player **202** are operatively coupled to the I/O controller **212**. As should be appreciated, the power contacts **222A** of the connector **216** are configured to engage the power contacts **222B** of the connector **218** so as to provide operational or charging power to the media player **202**, and the data contacts **226A** of the connector **216** are configured to engage the data contacts **226B** of the connector **218** so as to provide data transmissions to and from the media player **202**. The data contacts may be widely varied. For example, they may be configured to provide one or more data transmitting functionalities including Firewire, USB, USB 2.0, Ethernet, and the like. The connectors may also include a variety of other contacts **230** for transmitting other types of data as for example remote control, video (in/out), audio (in/out), analog TV, and the like.

FIGS. 6A and 6B are diagrams of a connector assembly pin arrangement **235**, in accordance with one embodiment of the present invention. As shown, the arrangement **235** includes a first connector **236** and a second connector **238**. The connectors **236** and **238** may be placed in a media player, docking station, at the end of a cord or cable and/or the like. By way of example, the connectors **236** and **238** may generally correspond to the connectors **216/218** of FIG. 5. The first and second connectors **236** and **238** each include a housing **240** and **242** and a plurality of corresponding contacts **244** and **246** that when engaged operatively couple the connectors **236** and **238** together. The housing is generally formed from an insulating material such as plastic and the contacts are generally formed from an electrically conductive material such as a copper alloy. In the illustrated embodiment, the contacts **244** protrude from the housing **240** for insertion into corresponding contacts **246** that are recessed within the housing **242** (e.g., male-female connection). In some cases, the contacts **244** are configured to snugly fit into the contacts **246** so that the connectors are held together. Additionally or alternatively, the connectors **236** and **238** may include a locking means for locking the connectors together. For example, one of the connectors may include a latch that engages and disengages to and from a portion of the other connector. The configuration of the contacts may be widely varied (e.g., spacing, # of rows or columns, etc.). In the illustrated embodiment, the contacts are spaced apart in a single row. The connectors may be manufactured using a variety of techniques. By way of example, the connectors may be manufactured using techniques similar to those used by JAE of Japan.

The signals carried by the contacts may be widely varied. For example, a portion of the contacts may be dedicated to

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Firewire signals while another portion may be dedicated to USB signals. The contacts may also be used for grounds, charging, powering, protocols, accessory identification, audio, line-in, line-out, and the like. Additional contacts may be used for grounding the housing of the connector. The number of contacts may also be widely varied. The number generally depends on the signals needed to support the devices using the connectors. In one embodiment, some of the contacts are used to support Firewire while other contacts are used to support USB. In this embodiment, the minimum number of contacts corresponds to the number required to support these devices. In most cases, however, the number of contacts tends to be greater than this number (other signals are needed). In the illustrated embodiment, each of the connectors includes at least 30 contacts, including Firewire contacts, USB contacts, grounding contacts, powering contacts, reserved contacts and the like. An example of a pin count which may be used can be seen in FIG. 6C. Although this pin count is shown, it should be noted that it is not a limitation and that any configuration of the functions described therein may be used.

FIGS. 7A-E are diagrams of a stand alone docking station **250**, in accordance with one embodiment of the present invention. The stand alone docking station **250** allows a media player **252** to communicate with other media devices (not shown). By stand alone, it is meant that it is physically separated from but operatively connectable to the media device (rather than being integrated therewith). As shown, the docking station **250** includes a housing **254** that encloses internally various electrical and structural components and that defines the shape or form of the docking station **250**. The shape of the housing may be widely varied. For example, it may be rectangular, circular, triangular, cubical, and the like. In the illustrated embodiment, the housing **254** has a rectangular shape. The housing **254** may be formed by one or more housing components. For example, as shown, the housing **254** may be made up of a top member **256** and a base member **258**. The manner in which the members **256** and **258** are connected may be widely varied (e.g., screws, bolts, snaps, latch, etc.).

Within a top surface **260** of the housing as shown in FIGS. 7A, 7B and 7E there is provided a media bay opening **262** for physically receiving a bottom portion **264** of the media player **252**. As shown, the media bay opening **262** has shape that coincides with the shape of the media player **252**, i.e., the bottom portion **264** of the media player **252** may be inserted within the media bay opening **262**. The depth of the opening **262** is generally configured to keep the user interface of the media player **252** exposed to the user. The opening **262** may be vertical or sloped. As shown in FIG. 7E, the opening **262** is sloped so that the media player **252** rests in a tilted position within the docking station **250**. As should be appreciated, a tilted media player **252** is easier to use (e.g., more ergonomic). The slope may be widely varied. For example, it may tilt the media player **252** about 5 to about 25 degrees and more particularly about 15 degrees.

Inside the opening **262** there is provided a first connector **266** for engaging a corresponding connector disposed on the bottom surface of the media player **252**. The first connector **266** is typically exposed through the housing **254** so that the media player connector can engage it. By way of example, the connector arrangement may correspond to the connector arrangement shown in FIG. 6. In the illustrated embodiment, the media player connector is a female port and the docking station connector **266** is a male plug. The plug is generally dimensioned for a tight fit within the port so as to secure the connection between the media player **252** and the docking station **250** (e.g., no interlock except for connector). The first

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connector 266 is generally sloped to a similar angle as the opening 262 so that engagement occurs between the first connector and the media player connector when the media player 252 is slid into the opening 262. As should be appreciated, the sides of the opening 262 serve as guides for placing the connectors in the correct engagement position.

The first connector 266 may be operatively coupled to one or more second connectors, each of which may be used to connect to some external device such as a media device, power plug and the like. In some cases, the information passing through the first connector 266 is directed to a single second connector while in other cases the information is split into multiple second connectors. For example, the contacts of a single connector 266 may be split into different connectors such as one or more data lines, power lines, audio lines and the like. The second connectors may be similar to the first connector or they may be different. Furthermore, multiple second connectors may be similar or they may be different from one another. The second connectors are also exposed through the housing. In some cases, the second connectors are indirectly coupled to the docking station 250. For example, they may be coupled to the docking station 250 through a cord or cable that is attached to the docking station 250. One end of the cord is coupled to the docking station 250 while the other end, which includes the second connector is free to be engaged with an external device. In other cases, the second connectors are directly coupled to the docking station 250. For example, they may be attached to a portion of the docking station 250 without using a cord or cable. In cases such as these, the second connectors are free to be engaged directly to an external device or they may be coupled through a removable cord or cable. Alternatively or additionally, the cord itself may be used to split information, i.e., a Y cord or cable.

The internal components of the docking station 250 can best seen in FIG. 7C. FIG. 7C shows the docking station 250 with the top member 256 of the housing 254 removed. As shown, the internal components include at least a first connector 266 and a second connector 268 (both of which may correspond to a connector arrangement shown in FIG. 6). The internal components may also include an audio out connector 270. The connectors 266-270 are connected via a flex cable 272. The connectors 266-270 are positioned on one or more printed circuit boards 274 that are attached to the base member 258 of the housing 254. The first connector 266 is located at a position that places it within the opening 262 of the housing 254 (as shown in FIG. 7B). The second connector 268 and the audio out connector 270 are located at positions that place them within openings 276 at the backside of the housing 254 for external connection therefrom (as shown in FIG. 7D). Also contained within the housing 254 is a ballast 278 enabling the docking station 250 to support the media player 252 when inserted therein. An EMI shield may also be placed over the flex cable 272 to provide shielding.

FIG. 8 is an illustration showing the docking station 250 of FIG. 7 in use, in accordance with one embodiment of the present invention. As shown, the docking station 250 is operatively coupled to a media device 280 through a cable 282, i.e., the first end of the cable 282 is engaged with the second connector 268 of the docking station 250 and the second end of the cable 282 is engaged with a connector positioned on the media device 280. Furthermore, the media player 252 is operatively coupled to the docking station 250 via the above mentioned connector arrangement, i.e., the media player 252 is positioned in the media bay opening 262 of the docking station 250 such that the connectors are engaged. Through these connections, the media player 252 may communicate with the media device 280, i.e., data and/or power may be

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passed therebetween. In the illustrated embodiment, the media player 252 is a music player and the media device 280 is a desktop computer. As such, the user, for example using the user interface on the media player 252, may upload or download songs between the media player 252 and the desktop computer 280 via the docking station 250. When uploading and downloading are completed, the user may simply remove the media player 252 from the docking station 250 and walk away.

FIGS. 9A-9C are diagrams of cable adapters 300, 302 and 304, respectively, that may be used with the docking station 250 of FIG. 7, in accordance with several embodiments of the present invention. In all three figures, the cable adapters 300, 302 and 304 include a docking station connector 306. The docking station connector 306 is configured to be received by the second connector 268 of the docking station 250. Although this connector arrangement may be widely varied, in the illustrated embodiment, the connector arrangement corresponds to the connector arrangement shown in FIG. 6.

As shown in FIG. 9A, the cable adapter 300 includes a cable 308. The docking station connector 306 is disposed at one end of the cable 308 and a media device connector 310 is disposed at the other end of the cable 308. The media device connector 310 may be widely varied. For example, it may correspond to a power connector, a Firewire connector, a USB connector and the like. It may also correspond to a connector similar to the docking station connector. In the illustrated embodiment, the media device connector 310 is a Firewire connector. An example of a cable adapter 300 including a docking station connector 306 using the pin count of FIG. 6C and a media device connector 310 using a 6 pin Firewire is shown in FIG. 9D.

Referring to FIG. 9B, the cable adapter 302 includes a pair of cables 312 and 314. The docking station connector 306 is disposed at one end of the cables 312 and 314 and a plurality of media device connectors 316 are disposed at the other ends of the cables 312 and 314. Each of the media device connectors 312 and 314 may be widely varied. For example, they may correspond to a power connector, a Firewire connector, a USB connector and the like. In the illustrated embodiment, the first media device connector 316A is a power connector and the second media device connector 316B is a USB connector.

As shown in FIG. 9C, the cable adapter 304 is configured to be used with a car stereo. The cable adapter includes a cable 318. The docking station connector 306 is disposed at one end of the cable 318 and a media device connector 320 is disposed at the other end of the cable 318. In this particular embodiment, the media device connector 320 is in the form of a cassette for insertion into a cassette deck of the car stereo. The cable adapter 304 also includes a power adapter plug 322 configured for insertion into a car power jack (e.g., cigarette lighter). The power adapter plug 322 extends from the docking station connector 306. In order to use the cable adapter 304, the user simply places the power adapter plug 322 in the power jack (this supports the docking station as well as provides power therethrough for powering or charging the media player) and the media device connector 320 in the cassette deck of the car stereo. The user may then select a song to be played through the car stereo using the user interface of the media player.

Although the cable adapters are shown as separate components of the docking station, it should be noted that in some embodiments they may be integrated therewith. That is, instead of having a docking station connector, the ends of the cables may be attached to the docking station.

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Referring to FIGS. 10-14, integrated docking stations will be described in greater detail. Like stand alone docking stations, the integrated docking stations allow a media player to communicate with other media devices. However, unlike the stand alone docking station, the integrated docking station is integrated with or built into the media device. As should be appreciated, the electrical and structural components of the integrated docking station are typically enclosed via the housing of the media device, i.e., the docking stations do not have their own housing. The housing of the media devices also typically defines the media bay in which the media player is placed for connectivity to the media device. That is, the media devices themselves include one or more media bays for receiving the media players. The media bays are typically externally accessible to the media players so that media players can be easily be inserted into or removed from the media bays. The media bays may be any of those previously described. The removability of the media players allows the media player to support a variety of different types of media devices in a flexible manner. By way of example, the media devices may correspond to desktop computers, notebook computers, home sound systems, car sound systems, portable sound systems, home theater systems, video projectors, displays, audio or video recording equipment, cameras (e.g., photos, video), telephones, and the like. They may also include peripheral computing devices such as scanners, printers, keyboards, and the like.

FIG. 10 is a notebook computer 350 with an integrated docking station 352, in accordance with one embodiment of the present invention. The notebook computer 350 includes a lid 354 and a base 356. The docking station 352 is integrated within the base 356. The docking station 352 includes a media bay 358 that may be placed anywhere on the base 356, as for example, the sides, top, front, back or bottom surfaces. The media bay 358 may be configured to receive any surface of a media player 359 so long as a connection is made between the media player 359 and the docking station 352. For example, it may be configured to receive the back of the media player as shown in FIG. 3 or it may be configured to receive the bottom of the media player as shown in FIG. 4. In the illustrated embodiment, the media bay 358 is configured to receive the back side of the media player 359 thus exposing the user interface of the media player 359 to the user. In some cases, the user interface may be the primary user interface of the notebook computer 350. For example, the touch pad of the media player shown in FIG. 1 may be used to perform actions on the notebook computer 350. By way of example, the notebook computer may correspond to any of those manufactured by Apple Computer of Cupertino, Calif.

FIG. 11 is a perspective diagram of a general purpose computer 360 with an integrated docking station 362, in accordance with one embodiment of the present invention. The computer 360 generally includes a base 364 and a display 366 operatively coupled to the base 364. The base 364 and the display 366 may be separate components, i.e., they each have their own housing, as in traditional computers or they may be integrated into a single housing so as form an all in one machine (as shown). The docking station 362 is integrated within the base 364. The docking station 362 includes a media bay 368 that may be placed anywhere on the base, as for example, the sides, top, front, back or bottom surfaces. The media bay 368 may be configured to receive any surface of a media player 369 so long as a connection is made between the media player 369 and the docking station 362. For example, it may be configured to receive the back of the media player as shown in FIG. 3 or it may be configured to receive the bottom of the media player as shown in FIG. 4. In the illustrated

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embodiment, the media bay 368 is configured to receive the bottom side of the media player 369. In some cases, the user interface of the media player 369 may be exposed and in other cases, the user interface may be completely covered within the media bay 358. By way of example, the general purpose computer may correspond to any of those manufactured by Apple Computer of Cupertino, Calif.

FIG. 12 is front view of a sound system 370 with an integrated docking station 372, in accordance with one embodiment of the present invention. The sound system may be widely varied. For example, it may be a substantially fixed or portable unit. In the illustrated embodiment, the sound system 370 is a flat panel unit that includes a base 374 and a pair of speakers 376. The docking station 372 is integrated within the base 374. The docking station 372 includes a media bay 378 that may be placed anywhere on the base 374, as for example, the sides, top, front, back or bottom surfaces. The media bay 378 may be configured to receive any surface of a media player 379 so long as a connection is made between the media player 379 and the docking station 372. For example, it may be configured to receive the back of the media player as shown in FIG. 3 or it may be configured to receive the bottom of the media player as shown in FIG. 4. In the illustrated embodiment, the media bay 378 is configured to receive the back side of the media player 379. In some cases, the user interface of the media player 379 may be the primary user interface of the sound system 370 and in other cases, the user interface is secondary to a user interface of the sound system 370.

FIG. 13 is a photo display 380 with an integrated docking station 382, in accordance with one embodiment of the present invention. The photo display 380 is configured to showcase one or more images. For example, the photo display may be set on a desk or placed on a wall to display one or more family photos in a controlled manner. The photo display 380 generally includes a base 384 and a display 386 that is disposed in the base 384. The docking station 382 is integrated within the base 384. The docking station 382 includes a media bay 388 that may be placed anywhere on the base 384, as for example, the sides, top, front, back or bottom surfaces. The media bay 388 may be configured to receive any surface of a media player 389 so long as a connection is made between the media player 389 and the docking station 382. For example, it may be configured to receive the back of the media player as shown in FIG. 3 or it may be configured to receive the bottom of the media player as shown in FIG. 4. In the illustrated embodiment, the media bay 388 is configured to receive the back side of the media player 389. In some cases, the user interface of the media player 389 may be the primary user interface of the photo display system and in other cases, the user interface is secondary to a user interface of the photo display system.

FIG. 14 is a mobile radio 390 with an integrated docking station 392, in accordance with one embodiment of the present invention. The mobile radio allows a user to connect to other users in a local area, as for example when two parties are outdoors in different locations. For example, the mobile radio may provide voice communications, messaging (pager, email), digital one way radio (one to one and group), digital two way radio (one to one and group), data services (wireless web and private networks). In one embodiment, the mobile radio 390 allows a media player 399 to act as a mobile broadcasting station. For example, the user may broadcast music from the media player 399 to other media devices in a local area or within a local network. The mobile radio 390 generally includes a base 394 that includes the radio broadcast

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components (e.g., antenna, transmitter, receiver, volume controls, squelch controls, frequency controls, etc.).

The docking station **392** is integrated within the base **394**. The docking station **392** includes a media bay **398** that may be placed anywhere on the base, as for example, the sides, top, front, back or bottom surfaces. The media bay **398** may be configured to receive any surface of the media player **399** so long as a connection is made between the media player **399** and the docking station **392**. For example, it may be configured to receive the back of the media player as shown in FIG. **3** or it may be configured to receive the bottom of the media player as shown in FIG. **4**. In the illustrated embodiment, the media bay **398** is configured to receive the back side of the media player **399** so that the user interface is exposed to the user. As such, the user may select a song and thereafter broadcast it to other users in the network.

Although the mobile radio and media device are shown as separate devices, it should be noted that they may be integrated thus eliminating the need for a docking station. For example, the radio broadcasting components such as receivers, transmitters, microphones, speakers and the like may be built into the media player as for example the media player shown in FIG. **1**. The radio broadcasting components may be widely varied. For example, they may be associated with technologies including FM, RF, Bluetooth, 802.11 UWB (ultra wide band), IR, magnetic link (induction) and/or the like.

FIG. **15** is a diagram of a wireless communication system **400**, in accordance with one embodiment of the present invention. The wireless communication system **400** generally includes a media player **402** and one or more media devices **404**. The media player **402** is configured to send media via a wireless communication link **406** to the media devices **404** and the media devices **404** are configured to receive the media sent by the media player **402** over the wireless communication link **406**. The media player is essentially configured to act as a personal transmitting station so that the user can transmit media stored on the media player to other devices. In some cases, the media devices **404** may also send media to the media player **402** and the media player **402** may also receive media from the media devices **404**. By way of example, the media may generally correspond to audio, video, images, text and the like.

In order to send and receive media, the players and devices **402** and **404** generally include a transmitter, a receiver or a transceiver as well as some sort of antenna. The media is generally sent via the transmitter and the media is generally received via the receiver. In one embodiment, the media player includes a transmitter while the media devices include a receiver (for one way communications). In another embodiment, both devices include a transceiver (for two way communications). The antenna may be fully contained within the players/devices **402** and **404** or they may extend outside the devices (as shown). By way of example, the wireless communication link may correspond to FM, RF, Bluetooth, 802.11, UWB (ultra wide band), IR (infrared), magnetic link (induction) and/or the like.

The media player **402** may be widely varied. In the illustrated embodiment, the media player corresponds to the media player shown in FIG. **1**. The media devices **404** may also be widely varied. These devices generally depend on the type of media being sent by the media player **402**. By way of example, the media devices **404** may generally correspond to a personal mobile radio **404A**, a personal tuning device **404B**, a personal display device **404C**, and the like. Personal generally refers to the fact that these devices pertain to a particular user. In one embodiment, these devices are handheld devices that are sized for placement into a pocket of the user. By being

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pocket sized, the user does not have to directly carry the device and therefore the device can be taken almost anywhere the user travels.

Personal mobile radios **404A** generally include a microphone and speaker (or audio jack) so as to allow voice communications. The mobile radios may be based on push to talk (PTT) whereby pressing a button opens the communication line from the mobile radio to the media player. The mobile radios typically include an antenna such as a rugged rubber duck that consists of a coiled up element encased in rubber. The mobile radios may also include a channel tuner for selecting which channel to receive and send information, and a volume control dial for adjusting the volume of the audio signal. The mobile radios may also include a small display showing the selected channel, received signal strength, output power and the like. Mobile radios are generally well known and will not be described in greater detail.

Personal tuning devices **404B** generally include a speaker (or headphone jack) and a volume control dial so as to listen to audio based media (e.g., music) being sent by the media player **402**. The personal tuning devices may also include an antenna and a frequency tuner for selecting which channel to receive and send information. In one embodiment, the personal tuning device **404B** corresponds to a radio (e.g., the media player may include an FM transmitter and the radio may include an FM receiver).

Personal display devices **404C** generally include a display so as to view video or imaged based media being sent by the media player **402**. In some cases, the personal display device **404C** additionally includes speakers and volume control so that both photos/video and audio based media may be received from the media player. The video or photos may be produced by the media player through a camera located thereon. The video or photos may also be stored in a storage component located within the media player. In one embodiment, the personal display device corresponds to a television or TV (e.g., the media player may include a VHF or UHF transmitter and the TV may include a VHF or UHF receiver).

The media devices may also include a media player **404D**, a notebook computer **404E** or a general purpose computer **404F**. The second media player **404D** may be similar to the first media player **402** or it may be a different device altogether. By way of example, the second media player **404D** may generally correspond to the media player shown in FIG. **1**. Both the notebook computer **404E** and the general purpose computer **404F** may include the hardware necessary for communicating over the wireless communication link (e.g., antenna, receivers, transceivers) or they may be connected to a wireless hub **410** that includes the required hardware.

FIG. **16** is a block diagram of a wireless communication system **420**, in accordance with one embodiment of the present invention. The system **420** generally includes a media player **422** and a media device **424** that connect via a wireless communication link **426**. Both the media player **422** and the media device **424** may be widely varied. For ease of discussion, the media device **424** corresponds to a second media player that is similar to the first media player. Both media players include a processor **428** that is operatively coupled to a user interface **430**, a storage block **432**, input/output circuitry **434** and a communication terminal **436**.

The processor **428** is configured to execute instructions and to carry out operations associated with the media players **422**, **424**. For example, using instructions retrieved for example from memory, the processor **428** may control the reception and manipulation of input and output data between components of the media players **422**, **424**. In most cases, the processor **428** executes instruction under the control of an oper-

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ating system or other software. The processor **428** can be a single-chip processor or can be implemented with multiple components.

The user interface **430** allows the user of the media players **422, 424** to initiate actions on the media players **422, 424** and provides the user with output associated with using the media players **422, 424** (e.g., audio, video, images, etc.). The user interface **430** may be widely varied. By way of example, the user interface **430** may include switches, buttons, keys, dials, trackballs, joysticks, touch pads, touch screens, displays, microphones, speakers, cameras, and the like.

The storage block **432** provides a place to hold data that is being used by the media players **422, 424**. By way of example, the storage block **432** may include Read-Only Memory (ROM), Random-Access Memory (RAM), hard disk drive, flash memory and/or the like. In the illustrated embodiment, the storage block includes at least a hard drive.

The input/output (I/O) support circuitry **434** controls interactions with one or more I/O devices **440** that can be coupled to the media players **422, 424**. The I/O support circuitry **434** may be integrated with the processor **428** or it may be a separate component (as shown). The I/O support circuitry **434** generally operates by exchanging data (and/or power) between the media players **422, 424** and the I/O devices **440** that desire to communicate with the media players **422, 424**. In most cases, the I/O devices **440** may be connected to the I/O support circuitry **434** through one or more connectors, wires or cables. By way of example, the I/O devices **440** may be internal or peripheral devices such as other media players, notebook computers, personal digital assistants, general purpose computers, storage devices, additional user interfaces, audio equipment (e.g., speakers, headphones), video or imaging equipment (e.g., cameras), network cards, and the like. In the illustrated embodiment, the I/O device **440** corresponds to a head set. The head set may be connected to the media player through a headphone jack.

The communication terminal **436** controls interactions with one or more media devices **424** that can be coupled to the media player **422** through a wireless link. The communication terminal **436** may include a transmitter, receiver or transceiver. In one embodiment, the first media player **422** includes a transmitter and the second media player **424** includes a receiver thereby providing one way communication therebetween. In the illustrated embodiment, the first media player **422** includes a first transceiver and the second media player includes a second transceiver **424** for two way communication therebetween. The transmitter is configured to transmit information over the wireless communication link and the receiver is configured to receive information over the wireless communication link while the transceiver is configured to both transmit and receive information over the wireless communication link. The components of the receivers, transmitters and transceiver are generally well known within the technological field from which they come (e.g., FM, RF, Bluetooth, 802.11 UWB, IR, magnetic link) and therefore they will not be described in greater detail.

FIG. **17** is a flow diagram of a wireless transmission method **450**, in accordance with one embodiment of the present invention. The method may be implemented by a media player, as for example the media player shown in FIG. **15** or **16**. The method generally begins at block **452** where a media item is selected. This is generally accomplished by user operating the media player via the user interface of the media player. Depending on the application, the user may conveniently move through a list of media items and thereafter make a selection once the desired media item is found. In the case of music, the user may scroll through a list of songs

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until a desired song is found. In the case of images, the user may move through a photo sheet until a desired image is found.

Following block **452**, the flow proceeds to block **454** where the remote recipients are selected. Remote recipients generally refer to other devices that are capable of receiving the selected media item from the media player. Selecting the remote recipients may include selecting a signal channel as for example in the case of a broadcast (e.g., FM) or selecting a desired address as for example in the case of a network connection (e.g., Bluetooth). In broadcasting, a media item is transmitted over airwaves for public reception by anyone with a receiver tuned to the right signal channel, i.e., the media item is cast or thrown in all directions at the same time. In networking, a media item is transmitted to one or more unique addresses, i.e., each media device has its own unique address. When utilizing broadcasting, the user may simply select a channel via the user interface of the media player. For example, the user of the media player may select FM 98.1 and therefore the user of the media device must select FM 98.1 in order to receive the media item. When utilizing networking, the user may select one or more addresses via the user interface of the media player. For example, the user may enter one or more unique address directly or the user may select one or more unique addresses from a preexisting group stored in the media player. In some cases, the unique addresses may be stored as a buddy list.

Following block **454**, the flow proceeds to block **456** where the media item(s) is transmitted. The media item may be transmitted locally to the media player and/or it may be transmitted wirelessly to the remote recipient. In most cases, the media item is transmitted to both the media player as well as to the remote recipients.

The various aspects of the method described above can be used alone or in various combinations. The method is preferably implemented by a combination of hardware and software, but can also be implemented in hardware or software. The method can also be embodied as computer readable code on a computer readable medium. The computer readable medium is any data storage device that can store data which can thereafter be read by a computer system. Examples of the computer readable medium include read-only memory, random-access memory, hard drive, flash memory, CD-ROMs, DVDs, magnetic tape, optical data storage devices, and carrier waves.

FIG. **18** is an illustration showing a personal transmitting station **500** in use, in accordance with one embodiment of the present invention. By way of example, the personal transmitting station **500** may correspond to the media player shown in FIG. **1**. The personal transmitting station **500** is wirelessly connected to one or more personal media devices **502** through one or more wireless links **504**. These devices **500** and **502** are connected via a wireless communication signal such as any of those previously described.

Although the personal transmitting station **500** may be configured to transmit several types of data to the personal media devices **502**, in the illustrated embodiment, the personal transmitting station **500** is configured to transmit audio data in the form of music **502** (e.g., the personal transmitting station includes MP3 functionality for example) to one or more personal media devices **502** acting as personal tuning devices. As such, the user of the personal transmitting station **500** can perform disc jockey functions, i.e., the user can determine what songs to be played on both the personal transmitting station **500** as well as the personal tuning devices **502**.

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In this particular illustration, a first skier **506** holds the personal transmitting station **500** while second, third and fourth skiers **508**, **510** and **512** each hold personal tuning devices **502**. As shown, the first skier **506** is located away from the second, third and fourth skiers **508**, **510** and **512**. The first skier **506** is located on a first hill **514**, the second and third skiers **508** and **510** are located on a ski lift **516**, and the fourth skier **502** is skiing down a second hill **518**. As should be appreciated, all of these locations are within the broadcasting or networking range of the personal transmitting station **500**.

The personal transmitting station **500** is configured to send a music signal to the personal tuning devices **502** held by the second, third and fourth skiers **508**, **510** and **512** and the personal tuning devices **502** are configured to receive the music signal sent from the personal transmitting station **500**. The first skier **506** can therefore effect changes to what is being listened to by the second, third and fourth skiers **508**, **510** and **512** by simply selecting a different song to be played on the personal transmitting station **500** (even though he is in a different location than the rest of the skiers). For example, the first skier **506** may end a first song and select a second song to be played therefore causing the personal transmitting station **500** to send the second song to the personal tuning devices **502**.

Both the personal transmitting station **500** as well as the personal tuning devices **502** include a means for outputting sound. For example, they may contain speakers or jacks for coupling to headphones. These devices may also include a means for adjusting the volume. For example, they may contain dials or buttons for increasing or decreasing the volume. In some cases, the personal tuning devices may include a means for making song requests, i.e., text messaging or voice communications.

While this invention has been described in terms of several preferred embodiments, there are alterations, permutations, and equivalents, which fall within the scope of this invention. For example, although the invention has been described in terms of an MP3 music player, it should be appreciated that certain features of the invention may also be applied to other types of media players such as video recorders, cameras, and the like. Furthermore, the MP3 music player described herein is not limited to the MP3 music format. Other audio formats such as MP3 VBR (variable bit rate), AIFF and WAV formats may be used. Moreover, certain aspects of the invention are not limited to handheld devices. For example, the touch pad may also be used in other computing devices such as a portable computer, personal digital assistants (PDA), cellular phones, and the like. The touch pad may also be used a stand alone input device that connects to a desktop or portable computer. It should also be noted that there are many alternative ways of implementing the methods and apparatuses of the present invention. For example, although the touch pad has been described in terms of being actuated by a finger, it should be noted that other objects may be used to actuate it in some cases. For example, a stylus or other object may be used in some configurations of the touch pad. It is therefore intended that the following appended claims be interpreted as including all such alterations, permutations, and equivalents as fall within the true spirit and scope of the present invention.

What is claimed is:

1. A male plug connector for connecting to a corresponding receptacle connector of a media player, the male plug connector comprising:

a housing designed to accommodate 30 contacts spaced apart in a single row of sequentially numbered contact locations, wherein the sequentially numbered contact locations include:

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digital contact locations 3 to 9 designated for digital signals including Firewire contact locations 3, 5, 7 and 9 designated for Firewire signals and Universal Serial Bus (USB) contact locations 4, 6, and 8 designated for USB signals, wherein, contact locations for Firewire signals and USB signals are interleaved to improve impedance matching;

an accessory identify contact location 10 designated for an accessory identify signal that has an associated electrical pull down to notify the media player of an accessory identification;

serial protocol contact locations 18 and 19 designated for serial protocol signals;

analog contact locations 25 to 28 designated for analog signals including audio contact locations 25, 26, 27, and 28 designated for audio signals, wherein, analog contact locations 25 to 28 are spaced apart from digital contact locations 3 to 9 to reduce crosstalk noise; and

ground contact locations 1, 16 and 30 designated for ground to improve ground coverage.

2. The male plug connector of claim 1, wherein the sequentially numbered contact locations further include additional ground contact locations 2, 15, and 29 designated for ground.

3. The male plug connector of claim 1, wherein the sequentially numbered contact locations further include:

an accessory power contact location 13 designated for an accessory power signal that can receive power from the media player; and

an accessory detect contact location 20 designated for an accessory detect signal.

4. The male plug connector of claim 1, further comprising: Firewire contacts disposed at contact locations 3, 5, 7 and 9 and appropriated for carrying the Firewire signals;

USB contacts disposed at contact locations 4, 6, 8 and 15 and appropriated for carrying the USB signals;

an accessory identify contact disposed at contact location 10 and appropriated for carrying the accessory identify signal;

serial protocol contacts disposed at contact locations 18 and 19 and appropriated for carrying the serial protocol signals;

audio contacts disposed at contact locations 25, 26, 27, and 28 and appropriated for carrying the audio signals; and

ground contacts disposed at contact locations 1 and 30 and appropriated for ground, wherein at least a subset of the contacts can be active when the male plug connector is connected to the corresponding receptacle connector of the media player.

5. The male plug connector of claim 4, wherein the housing is made of plastic;

wherein the contacts are made of an electrically conductive material, are disposed in a corresponding one of the sequentially numbered contact locations for the 30 contacts, and are recessed inside the housing in an off-center position; and

wherein at least one contact is made of a copper alloy.

6. The male plug connector of claim 1, wherein the housing further comprises a latch that engages and disengages and is configured to provide a locking mechanism when the plug connector mates with the corresponding receptacle connector of the media player.

7. The male plug connector of claim 6, wherein the latch includes at least one of a snap, a spring, or a magnet.

8. The male plug connector of claim 1, further comprising power contacts appropriated to carry power and located at locations 11 and 12.

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9. A male plug connector for connecting to a corresponding receptacle connector of a media player, the male plug connector comprising:

a housing designed to accommodate 30 contacts spaced apart in a single row of sequentially numbered contact locations, wherein the sequentially numbered contact locations include:

digital contact locations 3 to 9 designated for digital signals including USB contact locations designated for USB signals interleaved with contact locations designated for other digital signals to improve impedance matching;

analog contact locations 25 to 28 designated for one or more analog signals including at least one audio signal; and

ground contact locations 1, 16 and 30 designated for ground,

wherein, analog contact locations 25 to 28 are spaced apart from digital contact locations 3 to 9 to reduce crosstalk noise, and wherein locations 1, 16 and 30 are designated for ground contacts to improve ground coverage.

10. The male plug connector of claim 9, wherein the sequentially numbered contact locations further include ground contact locations 2, 15, and 29 designated for ground.

11. The male plug connector of claim 9, further comprising:

digital contacts disposed contact locations 3 to 9 and appropriated for carrying the digital signals;

analog contacts disposed at contact locations 25-28 and appropriated for carrying the analog signals; and

ground contacts disposed at contact locations 1 and 30 and appropriated for ground, wherein at least a subset of the plurality of contacts can be active when the plug connector is connected to the corresponding receptacle connector of the media player.

12. The male plug connector of claim 9, wherein the sequentially numbered contact locations further include an accessory identify contact location 10 designated for an accessory identify signal that has an associated electrical pull down function to notify the media player of an accessory identification.

13. The male plug connector of claim 9, wherein the sequentially numbered contact locations further include:

an accessory power contact location 13 designated for an accessory power signal that can receive power from the media player; and

an accessory detect contact location 20 designated for an accessory detect signal.

14. The male plug connector of claim 9, wherein the sequentially numbered contact locations further include:

serial protocol contact locations 18 and 19 designated for serial protocol signals.

15. The male plug connector of claim 9, wherein contact locations 3, 5, 7 and 9 are designated for Firewire signals.

16. The male plug connector of claim 9, wherein locations 4, 6, and 8 are designated for USB signals.

17. The male plug connector of claim 9, wherein the housing is made of plastic;

wherein the contacts are made of an electrically conductive material, are disposed in a corresponding one of the sequentially numbered contact locations for the 30 contacts, and are recessed inside the housing in an off-center position; and

wherein at least one contact is made of a copper alloy.

18. The male plug connector of claim 9, wherein the housing further comprises a latch that engages and disengages and

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is configured to provide a locking mechanism when the plug connector mates with the corresponding receptacle connector of the media player.

19. The male plug connector of claim 18, wherein the latch includes at least one of a snap, a spring, or a magnet.

20. The male plug connector of claim 9, further comprising power contacts appropriated to carry power and located at locations 11 and 12.

21. A male plug connector for connecting to a corresponding receptacle connector of a media player, the male plug connector comprising:

a housing designed to accommodate a plurality of contacts spaced apart in a single row of contact locations, wherein the contact locations are sequentially numbered from a first end to a second end, the contact locations including:

a first ground contact location at the first end designated for ground,

a second ground contact location at the second end designated for ground,

a third ground contact location between the first end and the second end designated for ground,

a first group of digital contact locations designated for one or more digital signals including USB, the first group of digital contact locations being disposed between the first ground contact location and the third ground contact location, and

a second group of analog contact locations designated for one or more analog signals including at least one audio signal, the second group of analog contact locations being disposed between the third ground contact location and the second ground contact location, wherein the first, second and third ground contact locations improve ground coverage,

wherein the first group of digital contact locations includes contact locations designated for USB signals interleaved with contact locations designated for non-USB digital signals to improve impedance matching, and

wherein, the first group of digital contact locations are spaced apart from the second group of analog contact locations to reduce crosstalk noise.

22. The male plug connector of claim 21, wherein contact locations from the first group of digital contact locations that are designated for USB are disposed consecutively in every other contact location.

23. The male plug connector of claim 21, wherein the plurality of contact locations comprises at least 30 contact locations, and wherein the first ground contact location is at contact location 1, the second ground contact location is at contact location 30, and the third ground contact location is at contact location 16, and wherein the sequentially numbered contact locations further include additional ground contact locations 2, 15, and 29 designated for ground.

24. The male plug connector of claim 23, wherein the first group of digital contact locations comprises locations 3 to 9, and wherein the second group of analog contact locations comprises locations 25 to 28.

25. The male plug connector of claim 24, wherein the first group of digital contact locations includes locations 3, 5, 7 and 9 designated for Firewire signals.

26. The male plug connector of claim 24, wherein the first group of digital contact locations includes locations 4, 6, and 8 designated for USB signals.

27. The male plug connector of claim 24, further comprising a plurality of contacts made of electrically conductive material disposed at the plurality of contact locations, respec-

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tively, wherein at least a subset of the plurality of contacts can be active when the plug connector is connected to the corresponding receptacle connector of the media player.

28. The male plug connector of claim 21, further comprising one or more power contacts made of electrically conductive material disposed in one or more of contact locations 8, 11 or 12.

29. The male plug connector of claim 21, wherein the contact locations further include an accessory identify contact location 10 designated for an accessory identify signal that has an associated electrical pull down function to notify the media player of an accessory identification.

30. The male plug connector of claim 21, wherein the contact locations further include:

- an accessory power contact location 13 designated for an accessory power signal that can receive power from the media player; and
- an accessory detect contact location 20 designated for an accessory detect signal.

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31. The male plug connector of claim 21, wherein the contact locations further include serial protocol contact locations 18 and 19 designated for serial protocol signals.

32. The male plug connector of claim 21, wherein the housing is made of plastic;

wherein the contacts are made of an electrically conductive material, are disposed in a corresponding one of the sequentially numbered contact locations, and are recessed inside the housing in an off-center position; and wherein at least one contact is made of a copper alloy.

33. The male plug connector of claim 21, wherein the housing further comprises a latch that engages and disengages and is configured to provide a locking mechanism when the plug connector mates with the corresponding receptacle connector of the media player.

34. The male plug connector of claim 33, wherein the latch includes at least one of a snap, a spring, or a magnet.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 7,627,343 B2
APPLICATION NO. : 10/423490
DATED : December 1, 2009
INVENTOR(S) : Anthony M. Fadell et al.

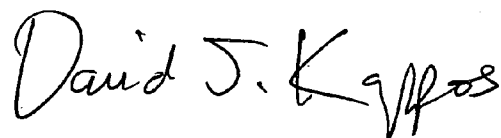
Page 1 of 1

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

In column 3, line 32, after “invention” insert -- . --.

Signed and Sealed this

Twenty-fifth Day of May, 2010

A handwritten signature in black ink that reads "David J. Kappos". The signature is written in a cursive, flowing style.

David J. Kappos
Director of the United States Patent and Trademark Office

EXHIBIT B

(12) **United States Patent**
Lydon et al.

(10) **Patent No.:** **US 7,305,506 B1**
(45) **Date of Patent:** **Dec. 4, 2007**

(54) **METHOD AND SYSTEM FOR
TRANSFERRING STATUS INFORMATION
BETWEEN A MEDIA PLAYER AND AN
ACCESSORY**

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Filson, San Jose, CA (US); **David**
Tupman, San Francisco, CA (US)

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(73) Assignee: **Apple Inc.**, Cupertino, CA (US)

(*) Notice: Subject to any disclaimer, the term of this
patent is extended or adjusted under 35
U.S.C. 154(b) by 0 days.

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(21) Appl. No.: **11/476,262**

Primary Examiner—Raymond N Phan

(74) *Attorney, Agent, or Firm*—Townsend and Townsend
and Crew LLP

(22) Filed: **Jun. 27, 2006**

(57) **ABSTRACT**

Related U.S. Application Data

(63) Continuation-in-part of application No. 10/833,689,
filed on Apr. 27, 2004.

(51) **Int. Cl.**
G06F 13/42 (2006.01)

(52) **U.S. Cl.** **710/105**; 710/300; 710/72;
710/63; 710/64

(58) **Field of Classification Search** 710/300–315,
710/62–66, 8–13, 72, 104–105; 455/557,
455/575; 719/312, 327; 709/321, 220
See application file for complete search history.

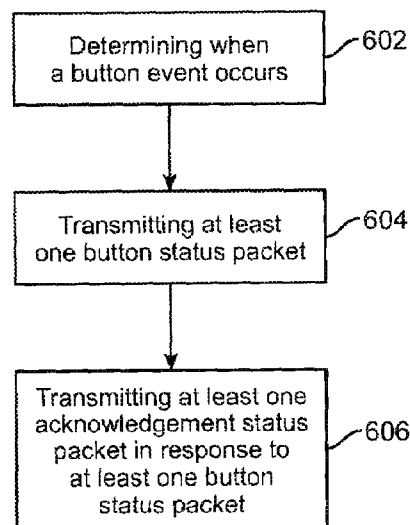
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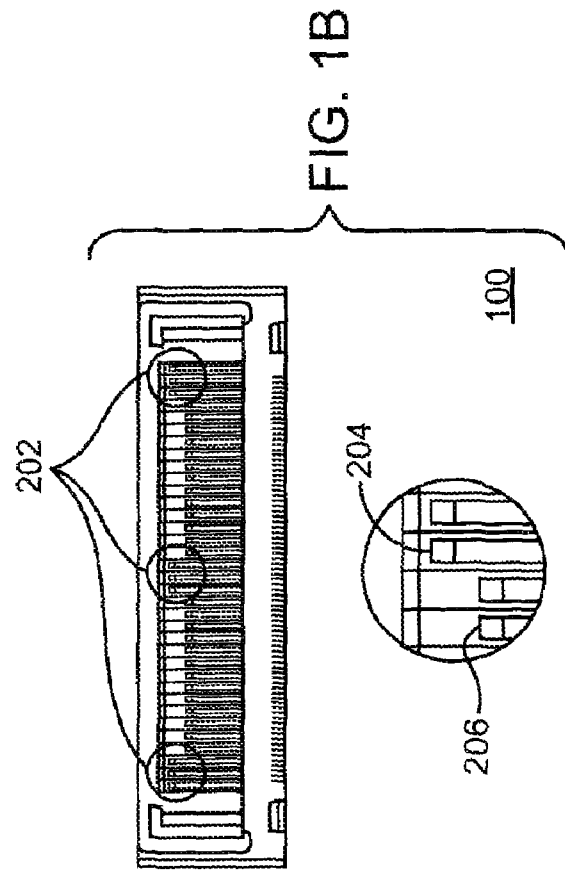
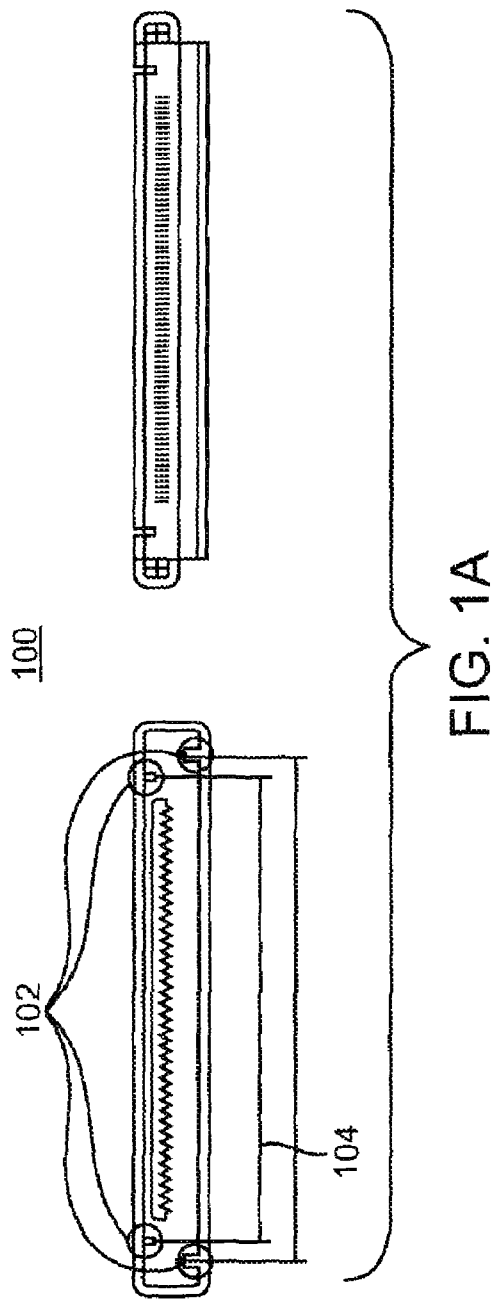
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A method, system, and connector interface for transferring status information between a media player and an accessory. The method includes determining, by the accessory, when a button event occurs; and transmitting, by the accessory, at least one button status command to the media player, where the one or more button status commands comprise a context-specific button status command and at least one command associated with a particular media type. According to the method and system disclosed herein, the media player and accessory may utilize a plurality of commands in a variety of environment such as within a connector interface system environment to facilitate the transfer of status information.

30 Claims, 11 Drawing Sheets



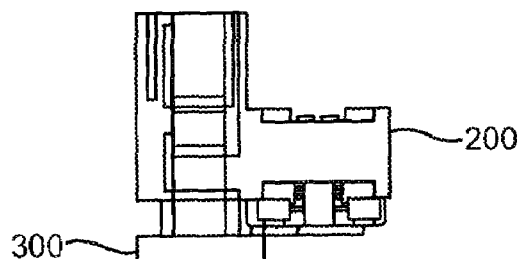
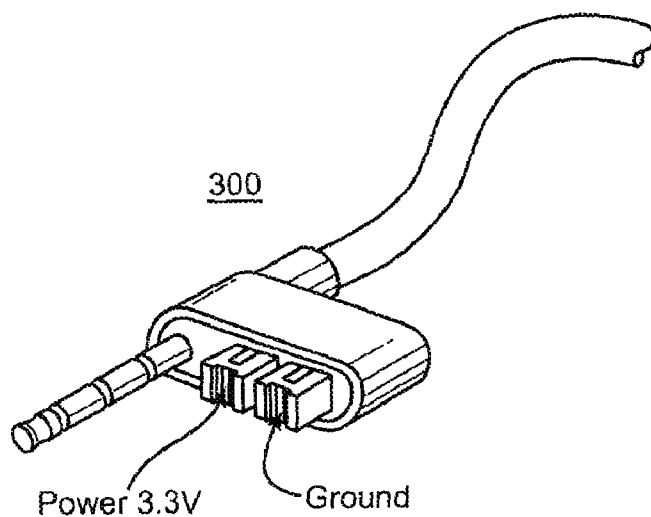
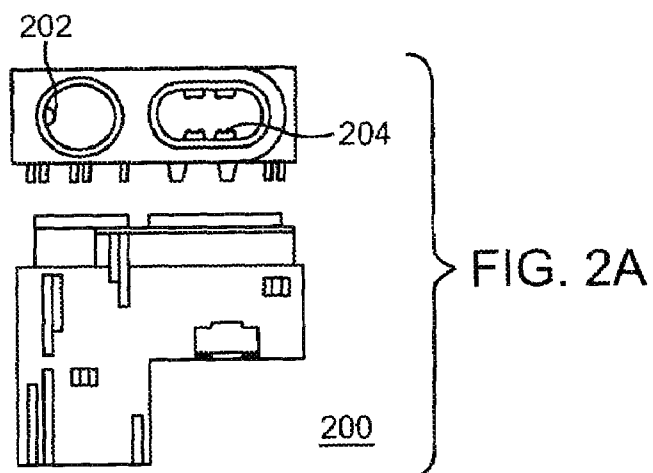


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Pin	Signal Name	I/O	Function
1	DGND	I	Digital Ground
2	DGND	I	Digital Ground
3	TPA+	I/O	Firewire signal
4	USB D+	I/O	USB signal
5	TPA-	I/O	Firewire signal
6	USB D-	I/O	USB signal
7	TPB+	I/O	Firewire signal
8	USB PWR	I	USB power in. NOT for powering; only to detect USB host
9	TPB-	I/O	Firewire signal
10	Accessory Identify	I	Pull down in dock to notify iPod of specific device
11	F/W PWR+	I	Firewire and charger input power (8V to 30V dc)
12	F/W PWR+	I	Firewire and charger input power (8V to 30V dc)
13	Accessory Pwr(3V3)	O	3.3V output from iPod. Current limited to 100mA.
14	Reserved		
15	DGND	GND	Digital Ground in iPod
16	DGND	GND	Digital Ground in iPod
17	Reserved		
18	Dock Tx	I	Serial protocol (Data to iPod)
19	Dock Rx	O	Serial protocol (Data from iPod)
20	Accessory Detect	I/O	
21	S Video Y	O	Luminance Component

22	S Video C	O	Chrominance Component
23	Video Composite	O	Composite Signal
24	Remote Sense	I	Detect Remote
25	LINE-IN L	I	Line level input to the iPod for the left channel
26	LINE-IN R	I	Line level input to the iPod for the right channel
27	LINE-OUT L	O	Line level output to the iPod for the left channel
28	LINE-OUT R	O	Line level output to the iPod for the right channel
29	Audio Return	GND	Audio return - Signal, never to be grounded inside accessory
30	DGND	GND	Digital Ground iPod
31	Chassis		Chassis ground for connector shell
32	Chassis		Chassis ground for connector shell

FIG. 3A

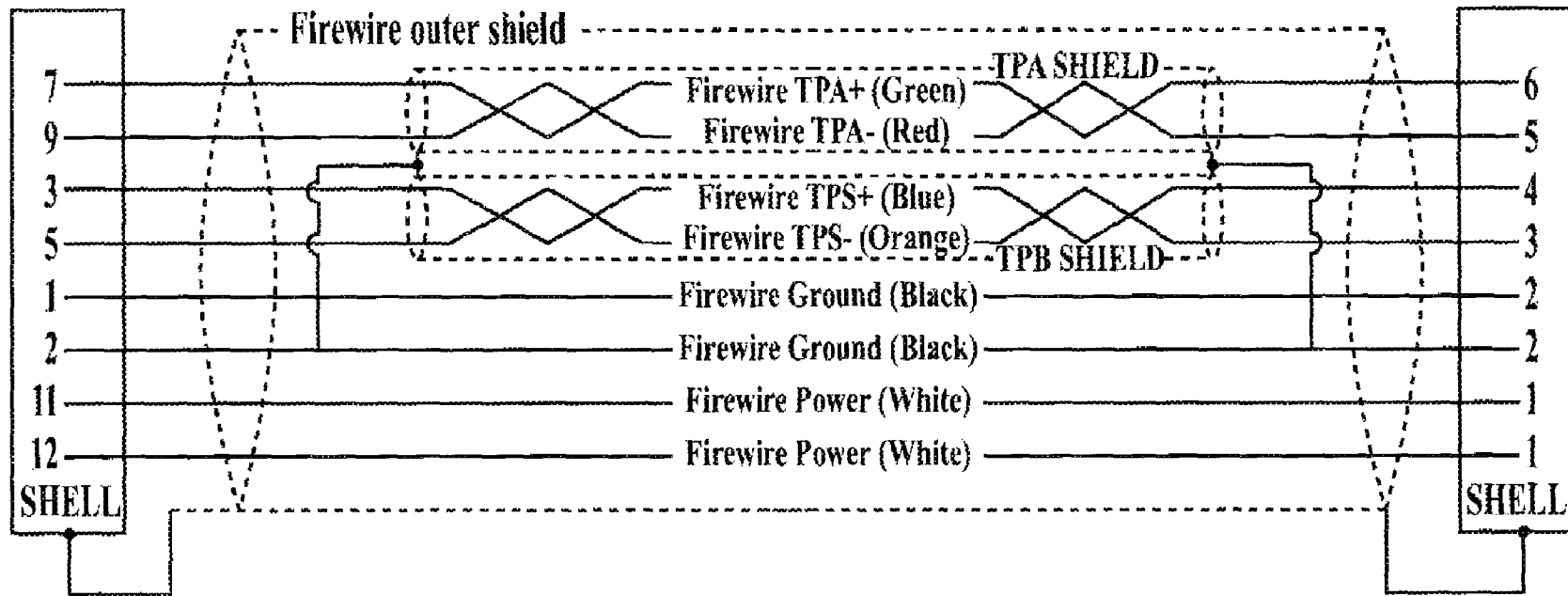


FIG. 4A

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Pin	Signal Name	I/O	Function
1	Audio Out Left / Mono Mic In	I/O	30mW audio out left channel, also doubles as mono mic in
2	HP Detect	I	Internal Switch to detect plug insertion
3	Audio Return	GND	Audio return for left and right audio
4	Audio Out Right	O	30mW audio out right channel
5	Composite Video	O	Video Signal
6	Accessory 3.3 V	O	3.3V Accessory power 100mA max
7	Tx	O	Serial protocol (Data from iPod to Device)
8	Rx	I	Serial protocol (Data to iPod from Device)
9	D GND	GND	Digital ground for accessory

FIG. 3B

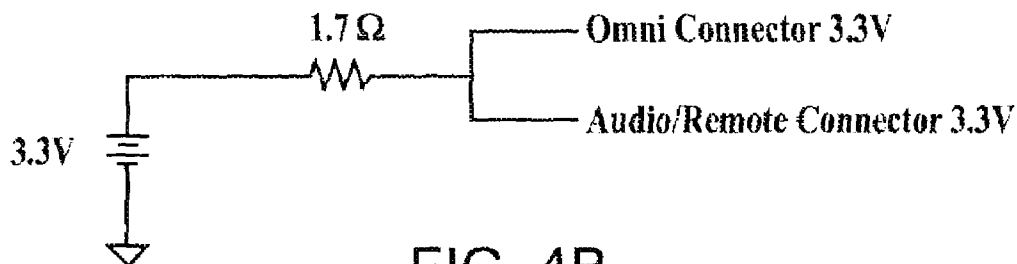


FIG. 4B

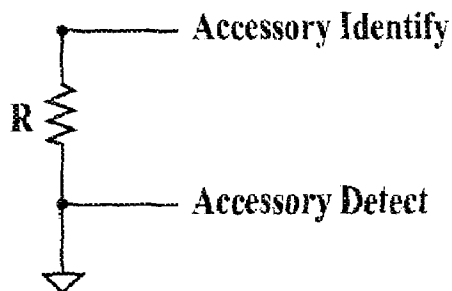


FIG. 4C

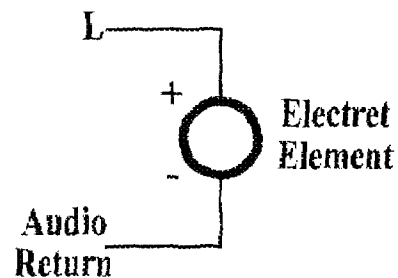


FIG. 4D

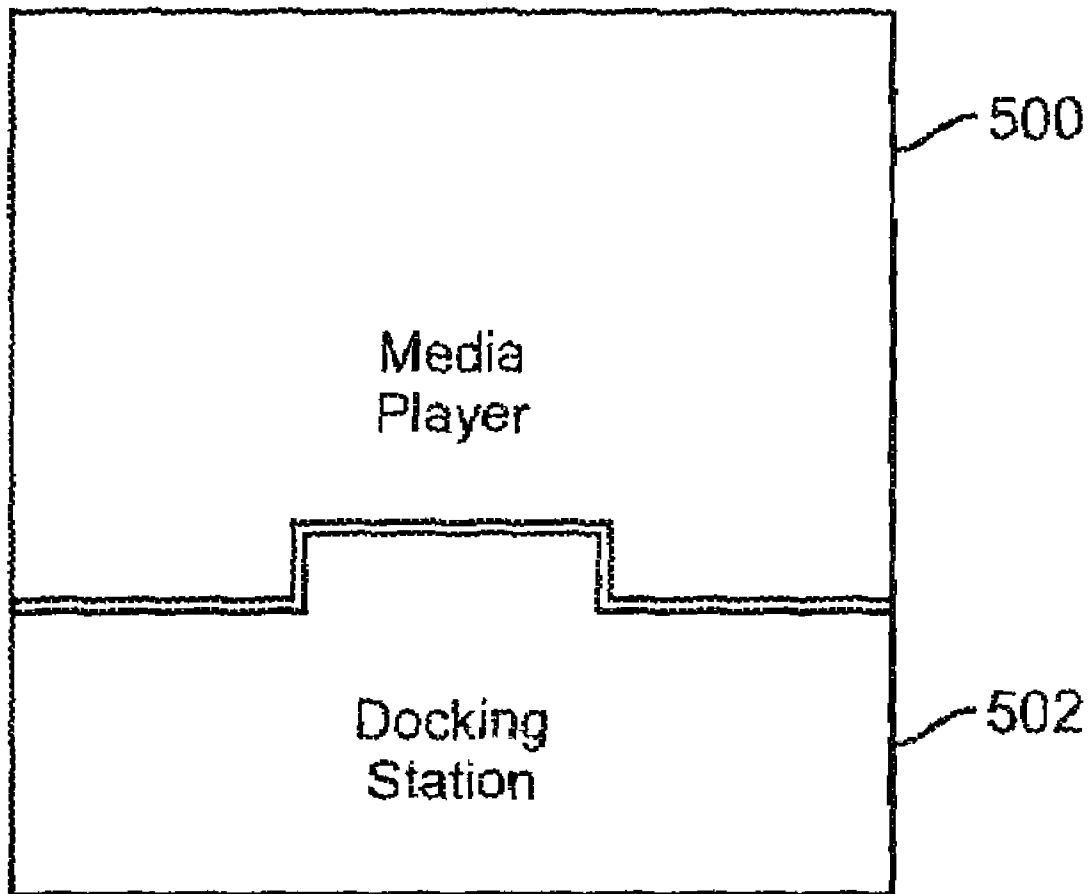


FIG. 5A

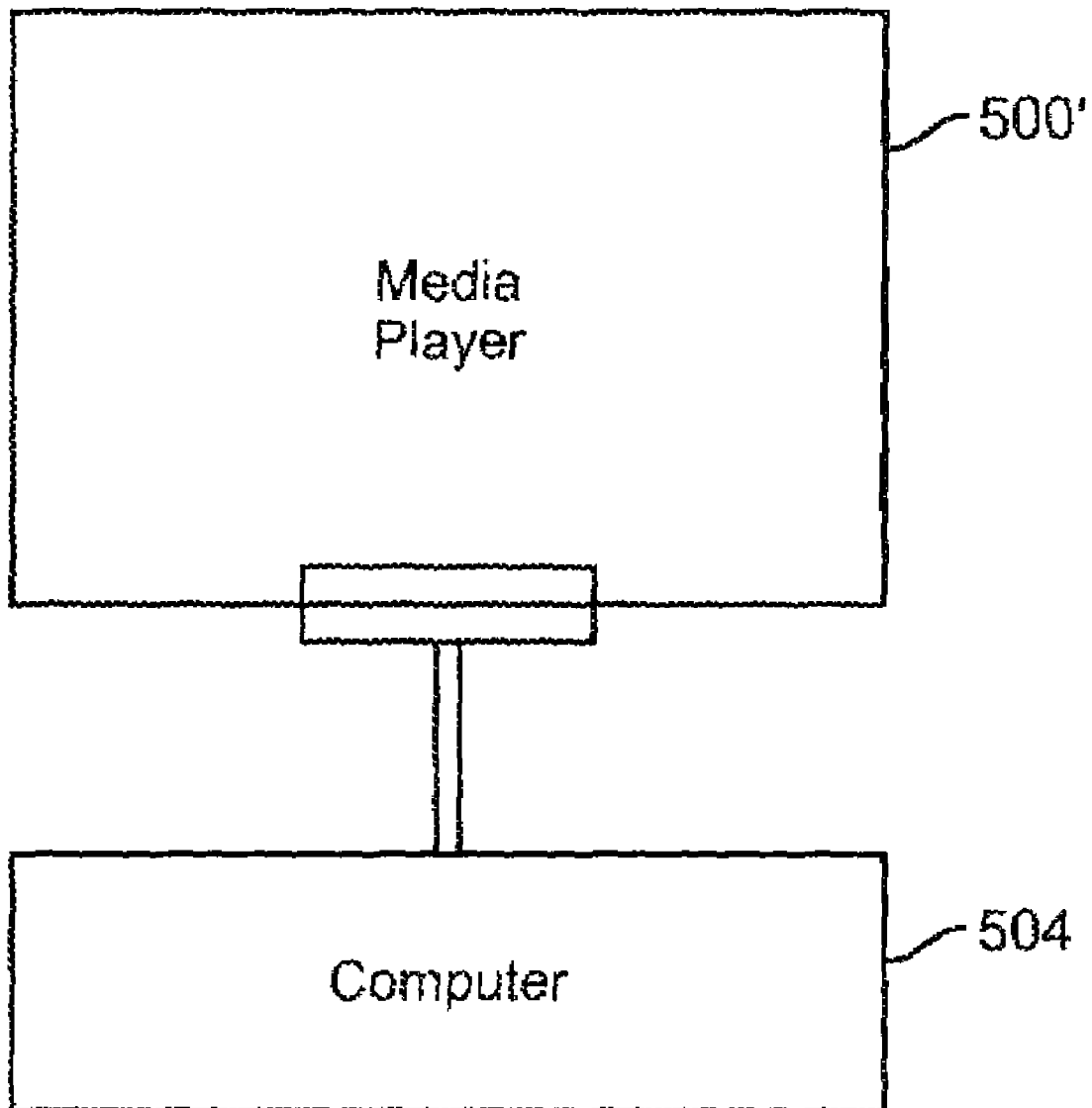


FIG. 5B

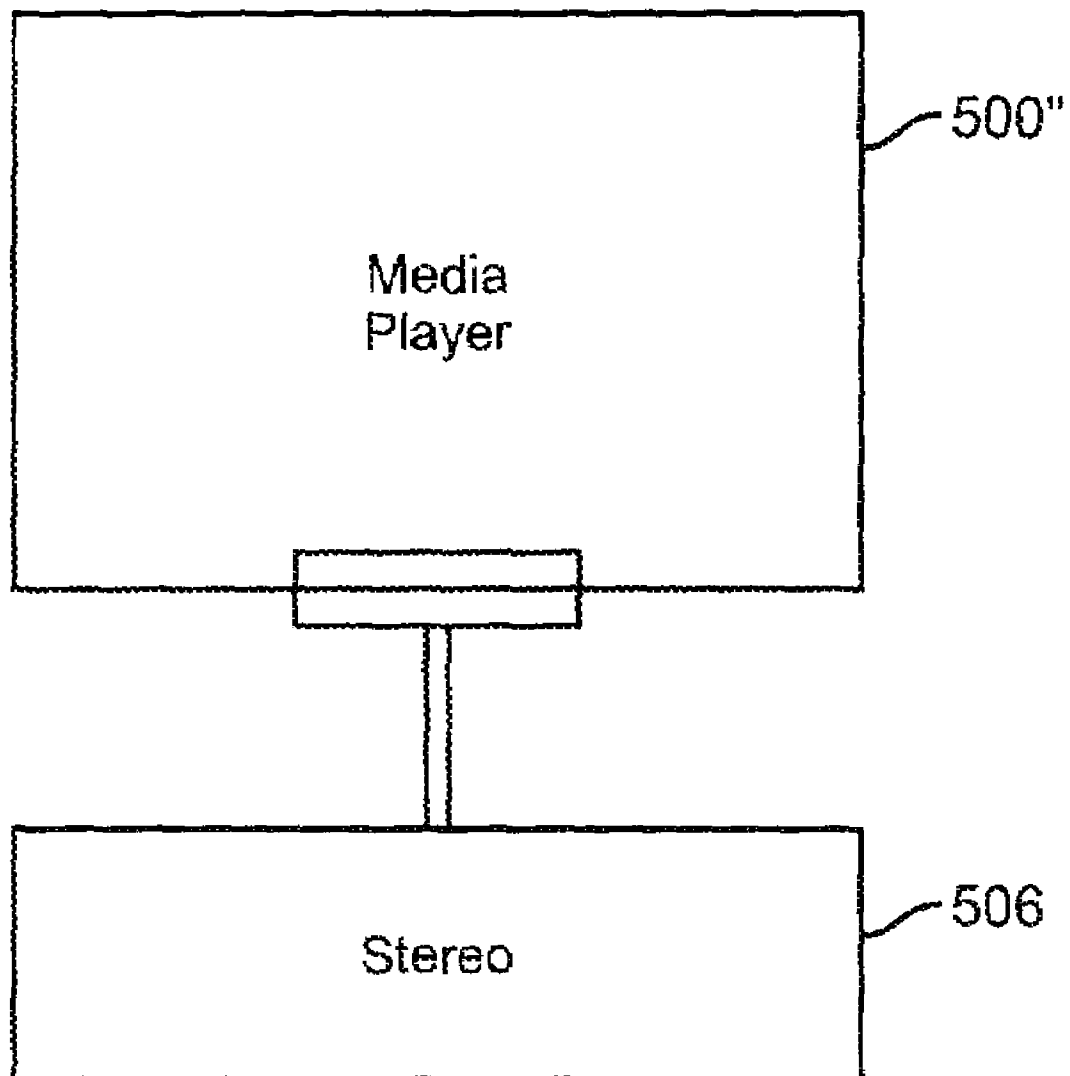


FIG. 5C

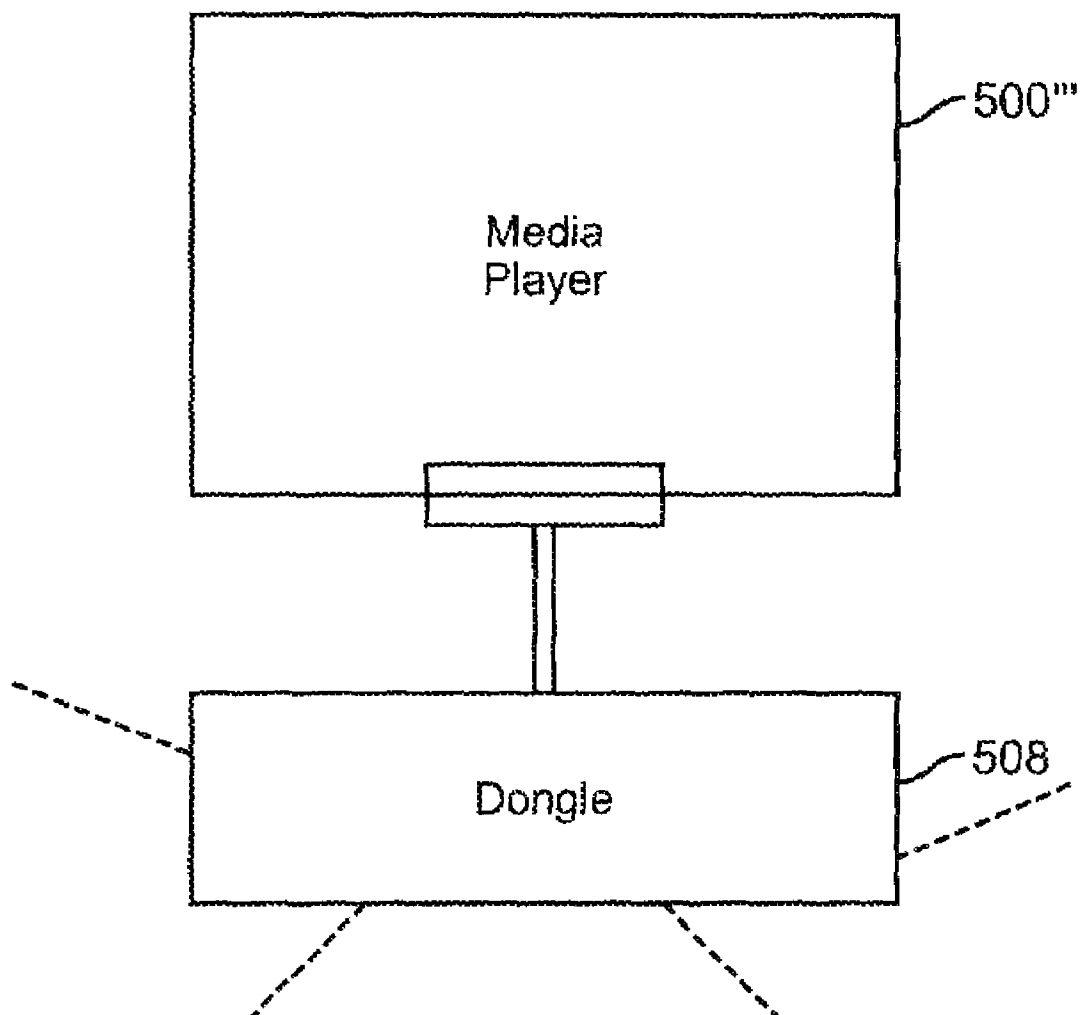


FIG. 5D

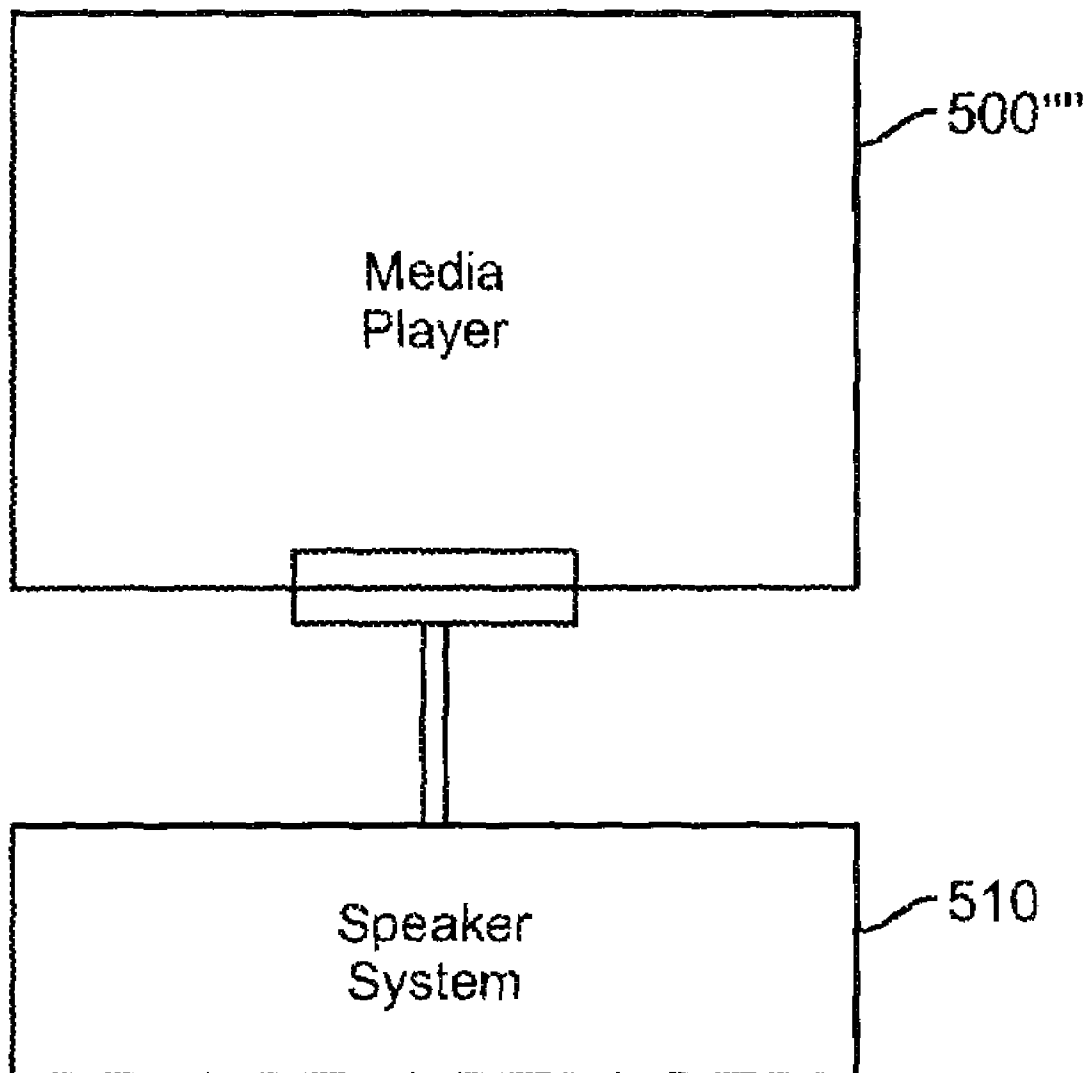


FIG. 5E

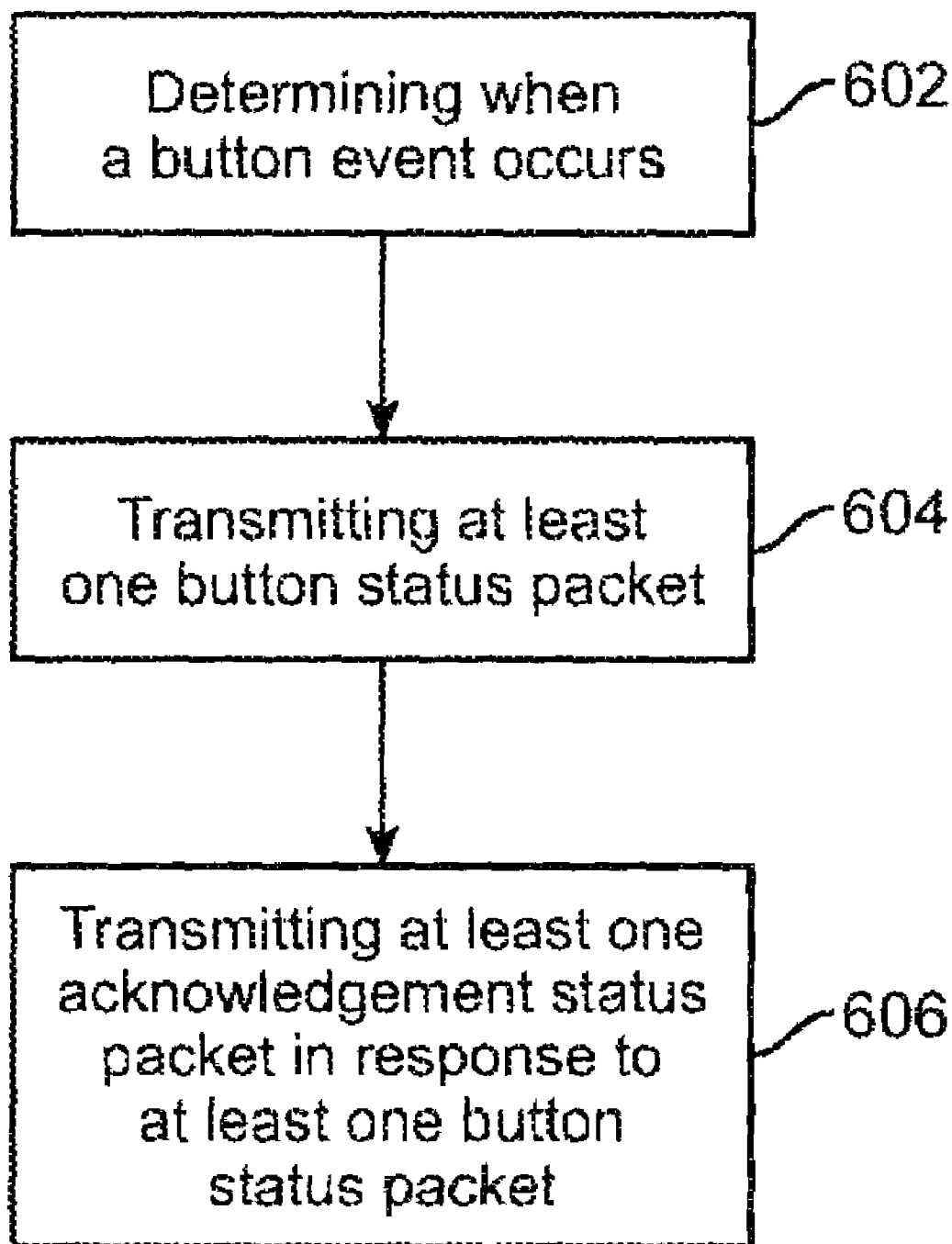


FIG. 6

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METHOD AND SYSTEM FOR TRANSFERRING STATUS INFORMATION BETWEEN A MEDIA PLAYER AND AN ACCESSORY

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a Continuation-In-Part of co-pending U.S. patent application Ser. No. 10/833,689, entitled "Connector Interface System for a Multi-Communication Device", filed on Apr. 27, 2004, and assigned to the assignee of the present application.

FIELD OF THE INVENTION

The present invention relates generally to electrical devices and more particularly to electrical devices such as media players that communicate with accessory devices.

BACKGROUND OF THE INVENTION

A media player stores media assets, such as audio tracks or photos that can be played or displayed on the media player. One example of a media player is the iPod® media player, which is available from Apple Computer, Inc. of Cupertino, Calif. Often, a media player acquires its media assets from a host computer that serves to enable a user to manage media assets. As an example, the host computer can execute a media management application to manage media assets. One example of a media management application is iTunes®, version 6.0, produced by Apple Computer, Inc.

A media player typically includes one or more connectors or ports that can be used to interface to the media player. For example, the connector or port can enable the media player to couple to a host computer, be inserted into a docking system, or receive an accessory device. There are today many different types of accessory devices that can interconnect to the media player. For example, a remote control can be connected to the connector or port to allow the user to remotely control the media player. As another example, an automobile can include a connector and the media player can be inserted onto the connector such that an automobile media system can interact with the media player, thereby allowing the media content on the media player to be played within the automobile.

With the introduction of various media types (images and video), communication between a media player and an accessory may be confusing to end users. Furthermore, it may be difficult to determine, if at all, whether information has been successfully transferred between a media player and an accessory.

Thus, there is a need for improved techniques to enable manufacturers of electronic devices to exchange information.

SUMMARY OF THE INVENTION

A method, system, and connector interface for transferring status information between a media player and an accessory is disclosed. The method includes determining, by the accessory, when a button event occurs; and transmitting, by the accessory, at least one button status command to the media player, where the one or more button status commands comprise a context-specific button status command and at least one command associated with a particular media type.

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According to the method and system disclosed herein, the media player and accessory may utilize a plurality of commands utilized in a variety of environments such as within a connector interface system environment to facilitate the transfer of status information.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGS. 1A and 1B illustrate a docking connector in accordance with the present invention.

FIG. 2A is a front and top view of a remote connector in accordance with the present invention.

FIG. 2B illustrates a plug to be utilized in the remote connector.

FIG. 2C illustrates the plug inserted into the remote connector.

FIG. 3A illustrates the connector pin designations for the docking connector.

FIG. 3B illustrates the connection pin designations for the remote connector.

FIG. 4A illustrates a typical FireWire connector interface for the docking connector.

FIG. 4B illustrates a reference schematic diagram for an accessory power source.

FIG. 4C illustrates a reference schematic diagram for a system for detecting and identifying accessories for the docking connector.

FIG. 4D is a reference schematic of an electret microphone that may be connected to the remote connector.

FIG. 5A illustrates a media player coupled to different accessories.

FIG. 5B illustrates the media player coupled to a computer.

FIG. 5C illustrates the media player coupled to a car or home stereo system.

FIG. 5D illustrates the media player coupled to a dongle that communicates wirelessly with other accessories.

FIG. 5E illustrates the media player coupled to a speaker system.

FIG. 6 is a flow chart, which illustrates a process for facilitating communication between a media player and an accessory.

DETAILED DESCRIPTION OF THE INVENTION

The present invention relates generally to electrical devices and more particularly to electrical devices such as media players that communicate with accessory devices. The following description is presented to enable one of ordinary skill in the art to make and use the invention and is provided in the context of a patent application and its requirements. Various modifications to the preferred embodiment and the generic principles and features described herein will be readily apparent to those skilled in the art. Thus, the present invention is not intended to be limited to the embodiment shown but is to be accorded the widest scope consistent with the principles and features described herein.

In a method and system in accordance with the present invention, media players and accessories are able to exchange status information using status commands. For example, in one embodiment, when the accessory determines that a button event occurs, the accessory transmits at least one button status command to the media player. The button status command includes one or more of a context-specific button status command, an image button status

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command, a video status button command, and an audio button status command. The media player may then transmit at least one acknowledgement status command to the accessory in response to the button status command. The media player and the accessory may utilize status commands, which may include commands associated with dedicated button status commands for different media types (e.g. image/slideshow, video, audio, etc.). The commands provide media control commands that support not only basic buttons such as play/pause, volume up, volume down, next track, and previous track but also media control commands that support context specific buttons such as next album, previous album, down arrow, etc. The media player and accessory may utilize the plurality of commands utilized in a variety of environments to facilitate the transfer of status information. One such environment is within a connector interface system environment such as described in detail hereinbelow.

Connector Interface System Overview

To describe the features of the connector interface system in accordance with the present invention in more detail, refer now to the following description in conjunction with the accompanying drawings.

Docking Connector

FIGS. 1A and 1B illustrate a docking connector **100** in accordance with the present invention. Referring first to FIG. 1A, the keying features **102** are of a custom length **104**. In addition, a specific key arrangement is used where one set of keys is separated by one length at the bottom of the connector and another set of keys is separated by another length at the top of the connector. The use of this key arrangement prevents noncompliant connectors from being plugged in and causing potential damage to the device. The connector for power utilizes a Firewire specification for power. The connector includes a first make/last break contact to implement this scheme. FIG. 1B illustrates the first make/last break contact **202** and also illustrates a ground pin and a power pin related to providing an appropriate first make/last break contact. In this example, the ground pin **204** is longer than the power pin **206**. Therefore, the ground pin **204** would contact its mating pin in the docking accessory before the power pin **206**, minimizing internal electrical damage to the electronics of the device.

In addition, a connector interface system in accordance with the present invention uses both USB and Firewire interfaces as part of the same docking connector alignment, thereby making the design more compatible with different types of interfaces, as will be discussed in detail hereinafter. In so doing, more remote accessories can interface with the media player.

Remote Connector

The connection interface system also includes a remote connector which provides for the ability to output and input audio, and output video and which also provides I/O serial protocol. FIG. 2A is a front and top view of a remote connector **200** in accordance with the present invention. As is seen, the remote connector **200** includes a top headphone receptacle **202**, as well as a second receptacle **204** for remote devices. FIG. 2B illustrates a plug **300** to be utilized in the remote connector. The plug **300** allows the functions to be provided via the remote connector. FIG. 2C illustrates the plug **300** inserted into the remote connector **200**. Heretofore, all of these features have not been implemented in a remote connector. Therefore, a standard headphone cable can be plugged in, but also special remote control cables, microphone cables, and video cables could be utilized with the remote connector.

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To describe the features of the connector interface system in more detail, please find below a functional description of the docking connector, remote connector and a command set in accordance with the present invention.

Docking and Remote Connector Specifications

For an example of the connector pin designations for both the docking connector and for the remote connector for a media player such as an iPod device by Apple Computer, Inc., refer now to FIGS. 3A and 3B. FIG. 3A illustrates the connector pin designations for the docking connector. FIG. 3B illustrates the connection pin designations for the remote connector.

Docking Connector Specifications

FIG. 4A illustrates a typical Firewire connector interface for the docking connector. The following are some exemplary specifications: Firewire power (8V-30V DC IN, 10W Max). In one embodiment, Firewire may be designed to the IEEE 1394 A Spec (400 Mb/s).

USB Interface

The media player provides two configurations, or modes, of USB device operation: mass storage and media player USB Interface (MPUI). The MPUI allows the media player to be controlled using a media player accessory protocol (MPAP) which will be described in detail later herein, using a USB Human Interface Device (HID) interface as a transport mechanism.

Accessory 3.3 V Power

FIG. 4B illustrates the accessory power source. The media player accessory power pin supplies voltages, for example, 3.0 V to 3.3V+/-5% (2.85 V to 3.465 V) over the 30-pin connector and remote connector (if present). A maximum current is shared between the 30-pin and Audio/Remote connectors.

By default, the media player supplies a particular current such as 5 mA. Proper software accessory detection is required to turn on high power (for example, up to 100 mA) during active device usage. When devices are inactive, they must consume less than a predetermined amount of power such as 5 mA current.

Accessory power is grounded through the Digital GND pins.

FIG. 4C illustrates a reference schematic diagram for a system for detecting and identifying accessories for the docking connector. The system comprises:

a) A resistor to ground allows the device to determine what has been plugged into docking connector. There is an internal pullup on Accessory Identify within the media player.

b) Two pins required (Accessory Identify & Accessory Detect)

FIG. 4D is a reference schematic of an electret microphone that may be connected to the remote connector.

Serial Protocol Communication:

a) Two pins used to communicate to and from device (Rx & Tx)

b) Input & Output (0V=Low, 3.3V=High)

As mentioned previously, media players connect to a variety of accessories. FIGS. 5A-5E illustrate a media player **500** coupled to different accessories. FIG. 5A illustrates a media player **500** coupled to a docking station **502**. FIG. 5B illustrates the media player **500** coupled to a computer **504**. FIG. 5C illustrates the media player **500** coupled to a car or home stereo system **506**. FIG. 5D illustrates the media player **500** coupled to a dongle **508** that communicates wirelessly with other devices. FIG. 5E illustrates the media

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player 500"" coupled to a speaker system 510. As is seen, what is meant by accessories includes but is not limited to docking stations, chargers, car stereos, microphones, home stereos, computers, speakers, and accessories which communicate wirelessly with other accessories.

As mentioned previously, this connector interface system could be utilized with a command set for transferring status information between a media player and an accessory. In one embodiment, the accessory may be a host computer or any other electronic device or system that may communicate with the media player. It should be understood by one of ordinary skill in the art that although the above-identified connector interface system could be utilized with the command set, a variety of other connectors or systems could be utilized and they would be within the spirit and scope of the present invention. To describe the utilization of the command set in more detail refer now to the following description in conjunction with the accompanying Figure.

Power Conservation

Accessory device power management is important as media players transition to smaller physical sizes with the objective of extending battery life. Also, some accessories may draw power from the media player, and some accessories supply power to the media player. In one embodiment, as an accessory interacts with the media player, the media player may notify the accessory when the media player state changes (e.g., transitions to on/sleep/hibernate/off states, etc.). In one embodiment, accessory power will be in a low-power mode by default, and will be raised to a high-power mode during playback if the accessory requests intermittent high power. A power management policy may be applied for multi-function devices.

In one embodiment, an accessory is responsible for keeping its power consumption below a preset maximum allowed limit for each media player state. For example, as indicated above, the accessory power may be completely shut off when the media player enters hibernate and off states. Accordingly, in such states, an accessory that is powered by a media player will be unable to wake the media player. In one embodiment, if the media player is in a sleep state, the serial accessory should transmit any packets sent to the media player with a sync byte followed by a short delay before sending the packet. When waking from a sleep state, the accessory may be required to re-identify and re-authenticate itself (as with other devices using the device identification commands and/or authentication commands). Self-powered accessories should detect the presence of media player accessory power and initiate the identification process.

Remote Protocol

A remote protocol provides commands that enable the media player and an accessory to interact remotely. For example, as described in more detail below, in one embodiment, some commands enable the accessory to transmit button commands to the media player to manipulate the user interface (UI) of the media player. In one embodiment, the remote protocol transmits to the media player command packets, which contain one or more button status commands, and the media player interprets the button status commands based on a UI application context (e.g., media player UI application context).

Command Functionality

Although a plurality of commands is described hereinbelow, one of ordinary skill in the art recognizes that many other commands could be utilized and their use would be

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within the spirit and scope of the present invention. Accordingly, the list of commands below is representative, but not exhaustive, of the types of commands that could be utilized to transfer and store data between a media player and an accessory. Furthermore, it is also readily understood by one of ordinary skill in the art that a subset of these commands could be utilized by a media player or an accessory and that use would be within the spirit and scope of the present invention. A description of the functionality of some of these commands is described below.

Status Commands

FIG. 6 is a flow chart, which illustrates a process for facilitating communication between a media player and an accessory. As FIG. 6 illustrates, the process begins in step 602 where one of the media player and the accessory determines when a button event occurs. In one embodiment, a button event occurs when a user selects or presses a control button (e.g., on the accessory). In one embodiment, a command may be utilized to determine when a button event has occurred. Next, in step 604 one of the media player and the accessory transmits at least one button status command to the other of the media player and the accessory, wherein the one or more button status commands include one or more of context-specific button status commands, image button status commands, video commands, and audio button status commands. The transmission of the button status reports occurs when a button event occurs. A button status command includes a button status, which is a bitmask representing each button that is currently pressed. In one embodiment, button status commands are transmitted repeatedly to the media player at preset intervals (e.g., between 30-100 ms) while one or more buttons are pressed. When all buttons are released, the accessory transmits a button status command that indicates that no buttons are pressed.

As described in more detail below, there are dedicated button status commands for each media type (e.g. image/slideshow, video, audio, etc.). In one embodiment, media control button status bits may be organized such that the most frequently used buttons will be assigned low bit positions. This may reduce the button status command sizes for frequently used buttons. Button status commands provide media control commands that support not only basic buttons such as play/pause, volume up, volume down, next track, and previous track, but also support media control commands that support context specific buttons such as next album, previous album, down arrow, etc. In one embodiment, an accessory may query the remote protocol to determine which particular media control commands the media player supports.

Button status is maintained separately for all ports and all commands. As a result, buttons may be in different states for different media control types. In one embodiment, for a given port and media control type, if a command has not been received within a preset time period after the last button status command, the button status will be reset to an "all buttons up" state.

In some embodiments, some commands may require authentication. For example, context specific send button status commands may require authentication for USB ports. Media control commands require authentication and will therefore require use of a command for device identification (ID) with an authentication option enabled.

Acknowledge Status Command

Still referring to FIG. 6, in a step 606, one of the media player and the accessory transmits at least one acknowledgement status command to the other of the media player

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and the accessory in response to at least one button status command. In one embodiment, the media player may transmit an acknowledgement status command to the accessory in response to some, but not necessarily all, commands. The acknowledge status command includes an acknowledgement command that indicates a command status, which may include whether the command was received. The command status may also indicate whether the received command does not return any data, whether the received command includes a bad parameter, whether the received command is unsupported by the media player, and/or whether the received command is invalid.

In one embodiment, parameters for the acknowledgment command may include: Command OK, Command failed (valid command, did not succeed), Out of resources (media player internal allocation failed), Bad parameter (command or input parameters invalid), Command pending (cmdPendTime parameter returned), Not authenticated (not authenticated), Mismatched authentication protocol version, Command ID for which the response is being sent, etc.

In addition to the bitmask that indicates each button that is currently pressed, a status command that the accessory transmits to the media player may include various types of button status commands such as context-specific button status commands, image button status commands, video button status commands, and audio button status commands.

Context-Specific Button Status Command

The context-specific button status command is a command that is associated with particular functions. The accessory transmits a status command containing a context-specific button status command to the media player when a context-specific button event occurs. In one embodiment, parameters for a context-specific button status bitmask may include: PlayPause, VolumeUp, VolumeDown, NextTrack, PreviousTrack, NextAlbum, PreviousAlbum, Stop, Play/resume, Pause, MuteToggle, NextChapter, PreviousChapter, NextPlaylist, PreviousPlaylist, ShuffleSettingAdvance, RepeatSettingAdvance, PowerOn, PowerOff, Backlight-For30 Seconds, BeginFF, BeginRew, RemoteMenu, RemoteSelect, RemoteUpArrow, RemoteDownArrow, etc. In one embodiment, the media player may not return an acknowledgement packet to the device in response to this command.

Image Button Status Command

The image button status command is a command that is associated with image-based media (e.g., photos, slide shows, etc.). The accessory transmits a status command containing an image button status command to the media player when a image-specific button event occurs. In one embodiment, parameters for an image-specific button status bitmask may include: PlayPause, NextImage, PreviousImage, Stop, Play/resume, Pause, ShuffleAdvance, RepeatAdvance, etc. In one embodiment, in response to the image button status command, the media player will return an acknowledgement status command to the accessory with the command status.

Video Button Status Command

The video button status command is a command that is associated with video media (e.g., movies, television shows, etc.). The accessory transmits a status command containing a video button status command to the media player when a video-specific button event occurs. In one embodiment, parameters for a video-specific button status bitmask may include: PlayPause, NextVideo, PreviousVideo, Stop, Play/resume, Pause, BeginFF, BeginREW, Next chapter, Previous chapter, Next frame, Previous frame, Caption advance, etc.

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In one embodiment, in response to the video button status command, the media player will return an acknowledgement status command to the accessory with the command status.

Audio Button Status Command

The audio button status command is a command that is associated with audio media (e.g., music, audiobooks, podcasts, etc.). The accessory transmits a status command containing an audio button status command to the media player when an audio-specific button event occurs. In one embodiment, parameters for an audio-specific button status bitmask may include: PlayPause, VolumeUp, VolumeDown, NextTrack, PreviousTrack, NextAlbum, PreviousAlbum, Stop, Play/resume, Pause, MuteToggle, NextChapter, PreviousChapter, NextPlaylist, PreviousPlaylist, ShuffleSettingAdvance, RepeatSettingAdvance, BeginFF, BeginRew, Record, etc. In one embodiment, in response to the audio button status command, the media player will return an acknowledgement status command to the accessory with the command status.

A method and system in accordance with the present invention, media players and accessories are able to exchange status information using status commands has been disclosed. In one embodiment, when the accessory determines that a button event occurs, the accessory transmits at least one button status command to the media player. The media player may then transmit at least one acknowledgement status command to the accessory in response to the button status command.

Although the present invention has been described in accordance with the embodiments shown, one of ordinary skill in the art will readily recognize that there could be variations to the embodiments and those variations would be within the spirit and scope of the present invention. For example, the present invention can be implemented using hardware, software, a computer readable medium containing program instructions, or a combination thereof. Software written according to the present invention is to be either stored in some form of computer-readable medium such as memory or CD-ROM, or is to be transmitted over a network, and is to be executed by a processor. Consequently, a computer readable medium is intended to include a computer readable signal, which may be, for example, transmitted over a network. Accordingly, many modifications may be made by one of ordinary skill in the art without departing from the spirit and scope of the appended claims.

What is claimed is:

1. A method for transferring status information between a media player and an accessory, the method comprising:
 - determining, by the accessory, when a button event occurs; and
 - transmitting, by the accessory, at least one button status command to the media player, wherein the one or more button status commands comprise a context-specific button status command and at least one command associated with a particular media type, wherein the button status commands comprise button status bits that are organized such that the most frequently used buttons are assigned low bit positions to reduce the overall button status data transfer size.
2. The method of claim 1 further comprising transmitting, by the media player, at least one acknowledgement status command to the accessory in response to the at least one button status command.
3. The method of claim 1 wherein the one or more button status commands support different media types.

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4. The method of claim 3 wherein the media types include one or more of image, video, or audio.

5. The method of claim 1 wherein the button status commands support a plurality of buttons including at least play/pause, volume up, volume down, next track, and previous track.

6. The method of claim 1 wherein the button status commands support a plurality of context-specific buttons including at least next album, previous album, and down arrow.

7. A protocol for transferring status information between a media player and an accessory, the protocol comprising: at least one command for determining, by the accessory, when a button event occurs; and

a plurality of commands for transmitting, by the accessory, at least one button status command to the media player, wherein the one or more button status commands comprise a context-specific button status command and at least one command associated with a particular media type,

wherein the button status commands comprise button status bits that are organized such that the most frequently used buttons are assigned low bit positions.

8. The protocol of claim 7 wherein the plurality of commands comprises a command for transmitting, by the media player, at least one acknowledgement status command to the accessory in response to the at least one button status command.

9. The protocol of claim 7 wherein the one or more button status commands support different media types.

10. The protocol of claim 7 wherein the button status commands support a plurality of buttons including at least play/pause, volume up, volume down, next track, and previous track.

11. The protocol of claim 7 wherein the button status commands support a plurality of context-specific buttons including at least next album, previous album, and down arrow.

12. The protocol of claim 9 wherein the media types include one or more of image, video, or audio.

13. A portable device comprising:

a media player;

an interface coupled to the media player; and

a command set in communication with the interface, wherein the command set enables the media player and an accessory to transfer status information therebetween, the command set comprising:

at least one command for determining, by the accessory, when a button event occurs; and

a plurality of commands for transmitting, by the accessory, at least one button status command to the media player, wherein the one or more button status commands comprise a context-specific button status command and at least one command associated with a particular media type,

wherein the button status commands comprise button status bits that are organized such that the most frequently used buttons are assigned low bit positions.

14. The media player of claim 13 wherein the plurality of commands comprises a command for transmitting, by the media player, at least one acknowledgement status command to the accessory in response to the at least one button status command.

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15. The media player of claim 13 wherein the one or more button status commands support different media types.

16. The media player of claim 13 wherein the button status commands support a plurality of buttons including at least play/pause, volume up, volume down, next track, and previous track.

17. The media player of claim 13 wherein the button status commands support a plurality of context-specific buttons including at least next album, previous album, and down arrow.

18. The media player of claim 15 wherein the media types include one or more of image, video, or audio.

19. An accessory comprising:

a device for transferring data;

an interface coupled to the device; and

a command set in communication with the interface, wherein the command set enables the media player and an accessory to transfer status information therebetween, the command set comprising:

at least one command for determining, by the accessory, when a button event occurs; and

a plurality of commands for transmitting, by the accessory, at least one button status command to the media player, wherein the one or more button status commands comprise a context-specific button status command and at least one command associated with a particular media type,

wherein the button status commands comprise button status bits that are organized such that the most frequently used buttons are assigned low bit positions.

20. The accessory of claim 19 wherein the plurality of commands comprises a command for transmitting, by the media player, at least one acknowledgement status command to the accessory in response to the at least one button status command.

21. The accessory of claim 19 wherein the one or more button status commands support different media types.

22. The accessory of claim 19 wherein the button status commands support a plurality of buttons including at least play/pause, volume up, volume down, next track, and previous track.

23. The accessory of claim 19 wherein the button status commands support a plurality of context-specific buttons including at least next album, previous album, and down arrow.

24. The accessory of claim 21 wherein the media types include one or more of image, video, or audio.

25. A computer-readable medium containing program instructions for transferring status information between a media player and an accessory, the program instructions which when executed by a computer system cause the computer system to execute a method comprising:

determining, by the accessory, when a button event occurs; and

transmitting, by the accessory, at least one button status command to the media player, wherein the one or more button status commands comprise a context-specific button status command and at least one command associated with a particular media type,

wherein the button status commands comprise button status bits that are organized such that the most frequently used buttons are assigned low bit positions.

26. The computer-readable medium of claim 25 further comprising program instructions for transmitting, by the

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media player, at least one acknowledgement status command to the accessory in response to the at least one button status command.

27. The computer-readable medium of claim **25** wherein the one or more button status commands support different media types. ⁵

28. The computer-readable medium of claim **25** wherein the media types include one or more of image, video, or audio.

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29. The computer-readable medium of claim **25** wherein the button status commands support a plurality of buttons including at least play/pause, volume up, volume down, next track, and previous track.

30. The computer-readable medium of claim **25** wherein the button status commands support a plurality of context-specific buttons such as next album, previous album, and down arrow.

* * * * *

EXHIBIT C

(12) **United States Patent**
Novotney et al.

(10) **Patent No.:** **US 7,587,540 B2**
(45) **Date of Patent:** **Sep. 8, 2009**

(54) **TECHNIQUES FOR TRANSFERRING STATUS INFORMATION BETWEEN AN ACCESSORY AND A MULTI-COMMUNICATION DEVICE**

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(75) Inventors: **Donald J. Novotney**, San Jose, CA (US); **John B. Filson**, San Jose, CA (US); **David Tupman**, San Francisco, CA (US)

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(73) Assignee: **Apple Inc.**, Cupertino, CA (US)

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

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(21) Appl. No.: **12/209,970**

Primary Examiner—Raymond N Phan

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(74) *Attorney, Agent, or Firm*—Townsend and Townsend and Crew LLP

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(51) **Int. Cl.**
G06F 13/42 (2006.01)

(52) **U.S. Cl.** **710/105**; 710/304; 710/64

(58) **Field of Classification Search** 710/105–108, 710/300–315, 62–64, 8–13; 455/575, 557; 719/312, 327; 709/321, 220

See application file for complete search history.

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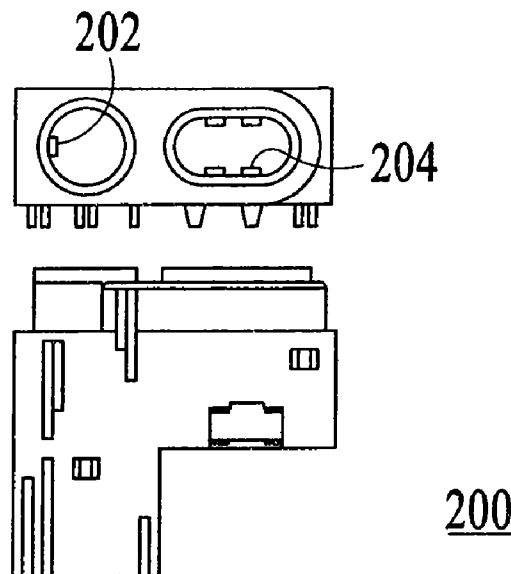
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(57) **ABSTRACT**

A connector interface system for a communication device is disclosed. The interface includes a docking connector. The docking connector includes first make/last break contacts that minimize internal damage to the internal electronics. The docking connector also includes specific keying arrangement to prevent noncompliant connectors from being plugged in, and thereby minimizes potential damage to the multi-communication device. The connector interface system also includes a remote connector which provides for the ability to output audio, input audio, provides I/O serial protocol, and to provide an output video. Embodiments of the present invention allow for a standard headphone cable to be plugged in but also for special remote control cables, microphone cables, video cables could be utilized in such a system. The connector interface system also includes a serial protocol to control device features. These controls help a user sort and search for data more efficiently within the device.

28 Claims, 5 Drawing Sheets



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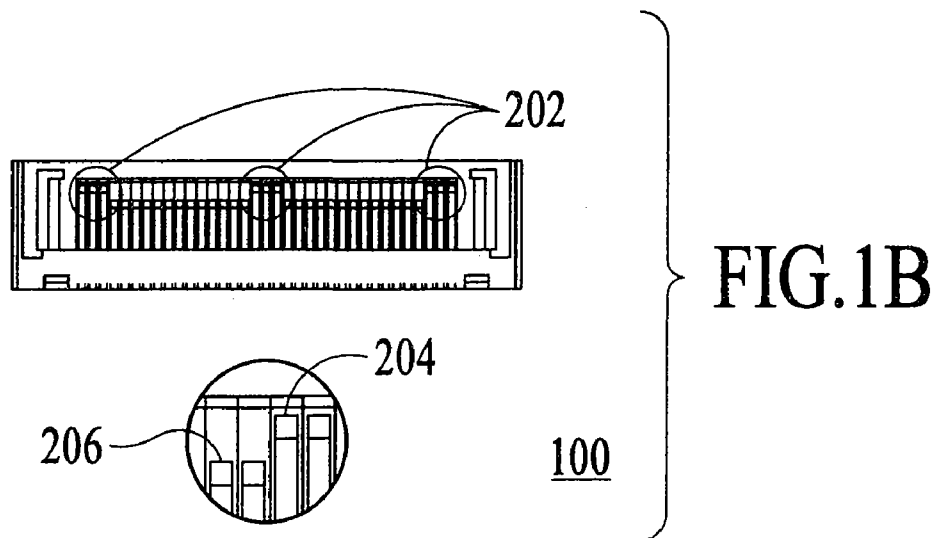
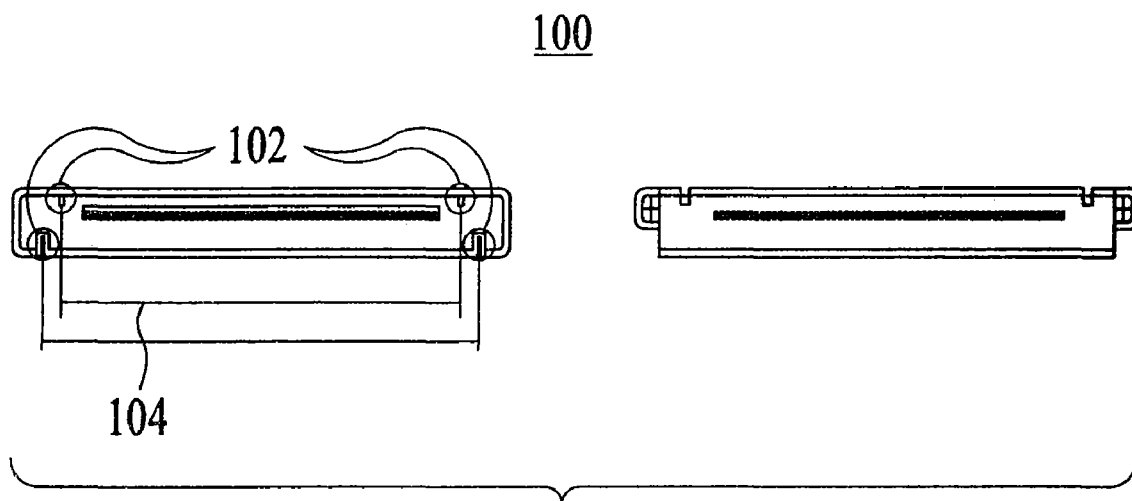
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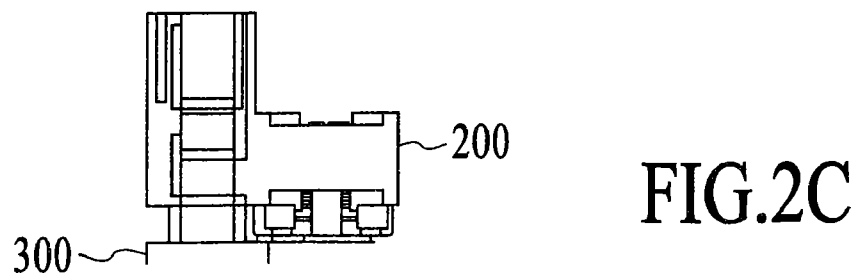
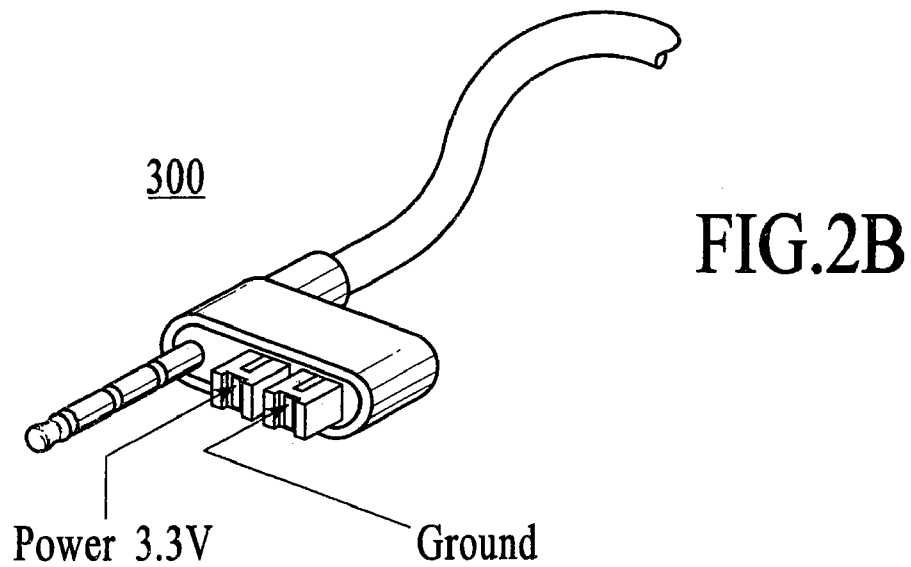
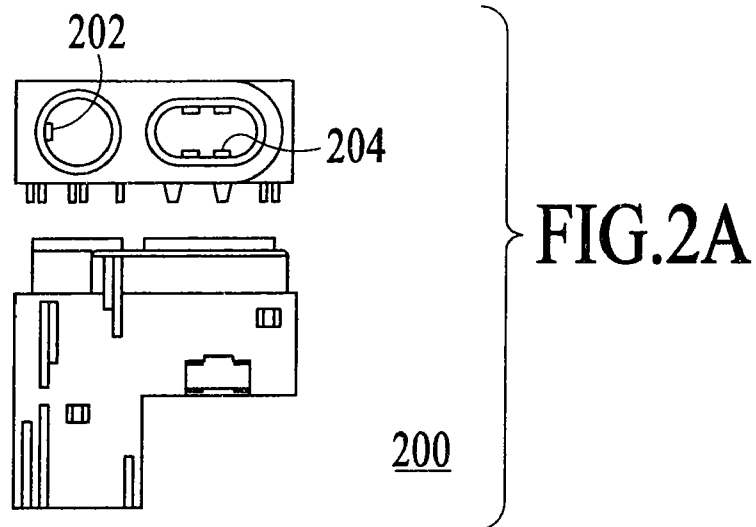


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3.1 CONNECTOR PIN DESIGNATIONS:

3.1.1 OMNI: JAE DDI 30 pin connector series

Pin	Signal name	I/O	Function
1	F/W GND	I	Firewire and charger ground
2	F/W GND	I	Firewire and charger ground
3	TPA+	I/O	Firewire signal
4	USB D+	I/O	USB signal
5	TPA-	I/O	Firewire signal
6	USB D-	I/O	USB signal
7	TPB+	I/O	Firewire signal
8	USB PWR	I	USB power in. NOT for powering; only to detect USB host
9	TPB-	I/O	Firewire signal
10	Accessory Identify	I	Pull down in dock to notify iPod of specific device
11	F/W PWR+	I	Firewire and charger input power (8V to 30V dc)
12	F/W PWR+	I	Firewire and charger input power (8V to 30V dc)
13	ACCESSORY PWR(3V3)	O	3.3V output from iPod. Current limited to 100mA.
14	Reserved		
15	USB GND	GND	Digital ground in iPod
16	DGND	GND	Digital ground in iPod
17	Reserved		
18	Dock Tx	I	Serial protocol (Data to iPod)
19	Dock Rx	O	Serial protocol (Data from iPod)
20	Accessory Detect	I/O	
21	Reserved		

22	Reserved		
23	Reserved		
24	Reserved		
25	LINE-IN L	I	Line level input to the iPod for the left channel
26	LINE-IN R	I	Line level input to the iPod for the right channel
27	LINE-OUT L	O	Line level output to the iPod for the left channel
28	LINE-OUT R	O	Line level output to the iPod for the right channel
29	Audio Return	GND	Audio return - Singal, never to be grounded inside accessory
30	DGND	GND	Digital ground iPod
31	Chassis		Chassis ground for connector shell
32	Chassis		Chassis ground for connector shell

FIG.3A

3.1.2 AUDIO/REMOTE: 8 pin Foxconn Apple Custom

Pin	Signal name	I/O	Function
1	Audio Out Left / Mono Mic In	I/O	30mW audio out left channel, also doubles as mono mic in
2	HP Detect	I	Internal Switch to detect plug insertion
3	Audio Return	GND	Audio teturn for left and right audio
4	Audio Out Right	O	30mW audio out right channel
5	Reserved		
6	Accessory 3.3V	O	3.3V Accessory power 100mA max
7	Tx	O	Serial protocol (Data from iPod to Device)
8	Rx	I	Serial protocol (Data to iPod from Device)
9	D GND	GND	Digital ground for accessory

FIG.3B

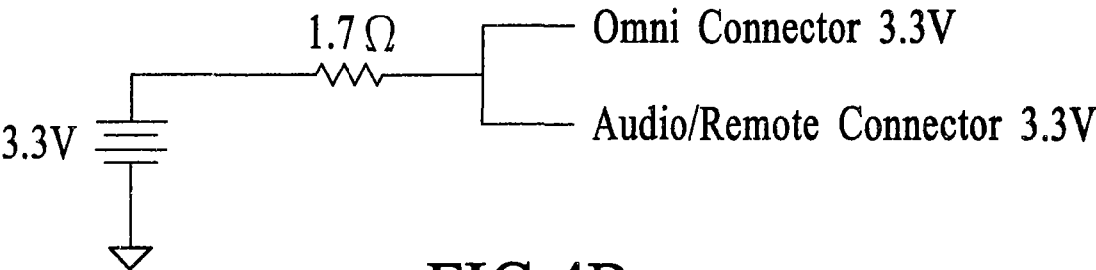


FIG.4B

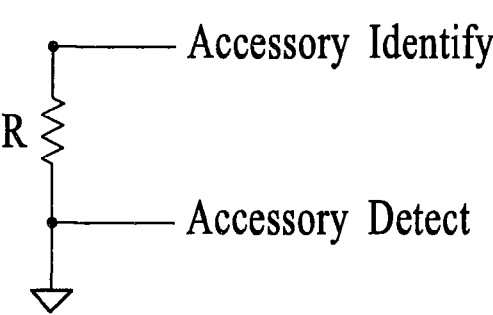


FIG.4C

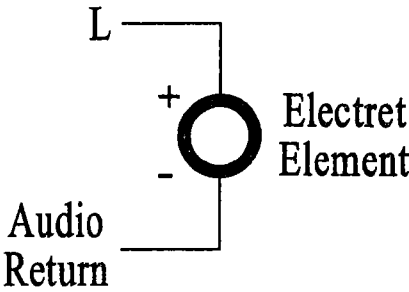


FIG.4D

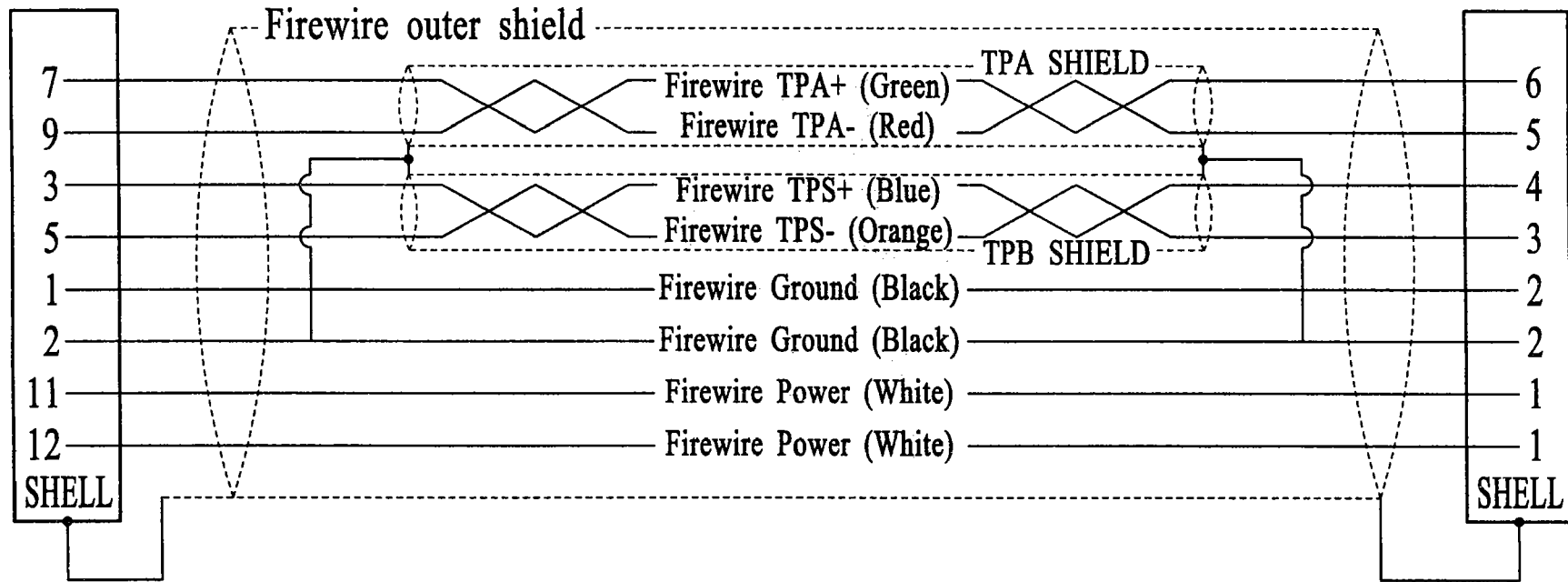


FIG.4A

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TECHNIQUES FOR TRANSFERRING STATUS INFORMATION BETWEEN AN ACCESSORY AND A MULTI-COMMUNICATION DEVICE

CROSS-REFERENCES TO RELATED APPLICATIONS

The present application claims priority from and is a continuation of U.S. Non-Provisional application Ser. No. 10/833,689, Apr. 27, 2004, entitled "CONNECTOR INTERFACE SYSTEM FOR ENABLING DATA COMMUNICATION WITH A MULTI-COMMUNICATION DEVICE," the entire contents of which are incorporated herein by reference for all purposes.

The contents of the following related applications are herein incorporated by reference in their entirety for all purposes:

(1) U.S. application Ser. No. 12/209,962 entitled "CONNECTOR INTERFACE SYSTEM FOR A MULTI-COMMUNICATION DEVICE" filed concurrently with the present application; and

(2) U.S. application Ser. No. 12/210,022 entitled "CONNECTOR INTERFACE SYSTEM FOR ENABLING DATA COMMUNICATION WITH A MULTI-COMMUNICATION DEVICE" filed concurrently with the present application.

(3) U.S. application Ser. No. 12/209,993 entitled "TECHNIQUES FOR TRANSFERRING INFORMATION BETWEEN AN ACCESSORY AND A MULTI-COMMUNICATION DEVICE" filed concurrently with the present application.

FIELD OF THE INVENTION

The present invention relates generally to multi-communication devices and more particularly to a connector interface system for such devices.

BACKGROUND OF THE INVENTION

Multi-communication devices are utilized in a variety of environments. What is meant by a multi-communication device is a device such as MP3 player, or other type of device that receives video, audio, and a variety of other digital data and can provide an output of the data. As these devices proliferate, a connector interface specification becomes more important, and also insuring that a particular multi-communications device interfaces appropriately with the appropriate external devices becomes more important.

In a typical connector interface, there is a docking connector that allows for the docking of the multi-communications device to a docking station for another type of communication for the device. A multi-communication device also typically includes a remote connector with the ability to output audio. As more multi-media content becomes available (i.e., digital video graphics, etc.) it is desirable to have a multi-media device which can effectively input and output such data.

Finally, such an interface typically has some sort of protocol to control device features from an external device and it also is desirable for the protocol to help the user sort and search for data faster and in an efficient manner. Heretofore, there is no device that includes features that overcome many of the above-stated problems. What is desired is a connector interface system which is utilized in such a device to address all the above-identified issues. The present invention addresses such a need.

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SUMMARY OF THE INVENTION

A connector interface system for a communication device is disclosed. The interface includes a docking connector. The docking connector includes first make/last break contacts that minimize internal damage to the internal electronics. The docking connector also includes specific keying arrangement to prevent noncompliant connectors from being plugged in, and thereby minimizes potential damage to the multi-communication device. The connector interface system also includes a remote connector which provides for the ability to output audio, input audio, and output video using an I/O serial protocol. Heretofore, all these features have not been implemented in a connector. Therefore, this would allow for a standard headphone cable to be plugged in but also for special remote control cables, microphone cables, video cables to be utilized in such a system. The connector interface system also includes a serial protocol to control device features. These controls help a user sort and search for data more efficiently within the device.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGS. 1A and 1B illustrate a docking connector in accordance with the present invention.

FIGS. 2A-2C illustrate the remote connector in accordance with the present invention.

FIG. 3A illustrates the connection pin designations for the docking connector.

FIG. 3B illustrates the connection pin designations for the remote connector.

FIG. 4A illustrates the Firewire connector interface.

FIG. 4B illustrates the USB connector interface.

FIG. 4C illustrates a reference schematic diagram for accessory detect and identify system for detecting and identifying accessories for the docking connector.

FIG. 4D is a reference schematic of an electret microphone that is within the remote connector.

DETAILED DESCRIPTION

The present invention relates generally to multi-communication devices and more particularly to a connector interface system for such devices. The following description is presented to enable one of ordinary skill in the art to make and use the invention and is provided in the context of a patent application and its requirements. Various modifications to the preferred embodiment and the generic principles and features described herein will be readily apparent to those skilled in the art. Thus, the present invention is not intended to be limited to the embodiment shown but is to be accorded the widest scope consistent with the principles and features described herein.

Connector System Overview

To describe the features of the connector system in accordance with the present invention in more detail, refer now to the following description in conjunction with the accompanying drawings.

Docking Connector

FIGS. 1A and 1B illustrate a docking connector **100** in accordance with the present invention. Referring first to FIG. 1A, the keying features **102** are of a custom length **104**. In addition, a specific key arrangement where one set of keys are separated by one length are at the bottom and another set of keys are separated by another length at the top of the connector is used. The use of this key arrangement prevents noncom-

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pliant connectors from being plugged in and causing potential damage to the device. The connector for power utilizes a Firewire specification for power. The connector includes a first make/last break contact to implement this scheme. FIG. 1B illustrates the first make/last break contact **202** and also illustrates a ground pin and a power pin related to providing an appropriate first mate/last break contact. In this example, the ground pin **204** is longer than the power pin **206**. Therefore, the ground pin **204** would contact its mating pin in the docking accessory before the power pin **206**. Therefore internal electrical damage of the electronics of the device is minimized.

In addition, a connector interface system in accordance with the present invention uses both USB and Firewire interfaces as part of the same docking connector alignment, thereby making the design more compatible with different types of interfaces, as will be discussed in detail hereinafter. In so doing, more remote systems and devices can interface with the multi-communication device.

Remote Connector

The connection interface system also includes a remote connector which provides for the ability to output audio, input audio, and output video using an I/O serial protocol. FIG. 2A is a front and top view of a remote connector **200** in accordance with the present invention. As is seen, the remote connector **200** includes a top headphone receptacle **202**, as well as, a second receptacle **204** for remote devices. FIG. 2B illustrates a plug **300** to be utilized in the remote connector. The plug **300** allows the features to be provided via the remote connector. FIG. 2C illustrates the plug **300** inserted into the remote connector **200**. Heretofore, all these features have not been implemented in a remote connector. Therefore, a standard headphone cable can be plugged in but also special remote control cables, microphone cables, video cables could be utilized with the remote connector.

Serial Protocol

The connector interface system also includes a serial protocol. The protocol is utilized to allow external devices to control the multi-communication device. These controls help a user sort and display for data more efficiently utilizing the device. A representation list of controls includes, but are not limited to:

- Next album
- Previous album
- Next chapter
- Previous chapter
- Next play list
- Previous play list
- Shuffle setting advance
- Repeat setting advance
- Backlight for 30 seconds
- Begin fast forward
- Begin rewind

To describe the features of the connector interface system in more detail, please find below a functional description of the docking connector, remote connector and a serial protocol in accordance with the present invention.

Docking and Remote Connector Specifications

For an example of the connector pin designations for both the docking connector and for the remote connector for a multi-communication device such as an iPod device by Apple Inc., refer now to FIGS. 3A and 3B. FIG. 3A illustrates the connector pin designations for the docking connector. FIG. 3B illustrates the connection pin designations for the remote connector.

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Docking Connector Specifications

FIG. 4A illustrates a typical FireWire connector interface for the docking connector:

FireWire Power:

a) 8V-30V DC IN

b) 10 W Max

FireWire:

a) Designed to IEEE 1394 A Spec (400 Mb/s)

FIG. 4B illustrates the USB connector interface.

USB 2.0:

a) Designed to USB 2.0 High Speed Spec

b) The USB Power (pin **8** on the 30-pin connector) is not used for powering device; only used to detect a USB host connection.

FIG. 4C illustrates a reference schematic diagram for accessory detect and identify system for detecting and identifying accessories for the docking connector. The system comprises:

a) A simple resistor to ground allows the device to determine what has been plugged into docking connector. There is an internal pullup on Accessory Identify.

b) Two pins required (Accessory Identify & Accessory Detect)

Serial Protocol Communication:

a) Two pins are used to communicate to and from device (Rx & Tx)

b) Input & Output (0V=Low; 3.3V=High)

c) A device with an identity resistor (ID #13) is a serial dock accessory.

A device coupled to the docking connector allows for a standard serial protocol to be utilized. Attaching a serial dock accessory makes any top-attached (remote connector) accessories inactive.

Line Level Input (Left & Right):

a) Stereo audio input b) Input Level 1V RMS (max)

a) Chassis ground is tied to specified pins

b) Digital ground should not be tied to Audio Return

Remote Connector Specifications

Audio Out:

a) Stereo Output per channel volume controlled by device

Mono Mic In:

a) Mono mic in through Left channel

b) Filtered electret power supplied by internal device

FIG. 4D is a reference schematic of an electret microphone that is within the remote connector.

Serial Protocol Communication:

a) Two pins used to communicate to and from device (Rx & Tx)

b) Input & Output (0V=Low, 3.3V=High)

Serial Protocol

Protocol Generalities

As previously mentioned, another feature of the present invention is the use of a serial protocol for allowing features to be implemented for remote devices. In a preferred embodiment, the protocol builds upon a signaling protocol, such as the RS-232 serial specification. However, the signaling levels are nonstandard. In true RS-232, a mark is -7V and a space is 7V. In this protocol, a mark is 3.3V and a space is 0V. The signaling rate for this protocol is 19,200 bps. All signaling is at 8 bits data, no parity and one stop bit (8-N-1).

This protocol is to be used in both directions of a link. Every device is encouraged to implement both sending and receiving capabilities. It is possible to determine the direction (host to device or device to host) of a packet from its

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contents only. This means that no packet is valid for sending from both the host and device.

All devices must be able to handle variable-length packets. For example, even though an identify packet currently has no defined data, a device must be able to understand an identify packet with data and should respond to the best of its ability. It must at least not lose sync to the packet signaling.

<u>Lingo Specifications</u>	
Lingo	ID
General	0x00
Microphone	0x01
Simple Remote	0x02
Display Remote	0x03
RF transmitter	0x05

The general lingo is shared for housekeeping commands across all devices. The microphone lingo is used by the remote connector on the multi-communication device. The simple remote lingo is used by a standard in-line remote control. The display remote lingo is reserved for a device with similar functionality to the standard remote but with a display for status.

<u>General Lingo Specification</u>		
Command	ID	Data Length
Request identify	0x00	0x00
Identify	0x01	0x01+

The host may send a request identify to the device to ask the device to reidentify itself.

The device sends an identify packet to identify itself. At this time multifunction (combo) devices are not supported. The identify data payload is thus the command ID 0x01 followed by a single byte of the same value as the lingo specification of the functionality the device implements unless specified otherwise. The identify packet returned in response to a request identify packet does not need to have the extra sync bytes and delays used during the startup process.

<u>Simple Remote Lingo Specification</u>		
Command	ID	Data Length
Buttons status	0x00	0x00+

A simple remote device sends a buttons status command to indicate an updated status of which buttons are held down. The data of the packet is a number of bytes indicating which buttons are currently held down. The bytes are made up by ORing the masks of the buttons together. The device will send a 0x00 in data (or no data) to indicate all buttons are released. While any buttons are held down the device should repeat this packet on a predetermined interval. If no packet of this sort is received by the host for 200 ms the host may assume a packet was lost and go to "all buttons up" mode.

A representative simple remote button map is shown below:

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<u>Simple Remote Button Map</u>		
Button	Number	Byte No, Mask
Play/Pause	0	0, 0x01
Volume Up	1	0, 0x02
Volume Down	2	0, 0x04
Next Track	3	0, 0x08
Previous Track	4	0, 0x10
Next Album	5	0, 0x20
Previous Album	6	0, 0x40
Stop	7	0, 0x80
Play/Resume	8	1, 0x01
Pause	9	1, 0x02
Mute toggle	10	1, 0x04
Next Chapter	11	1, 0x08
Previous Chapter	12	1, 0x10
Next Playlist	13	1, 0x20
Previous Playlist	14	1, 0x40
Shuffle setting advance	15	1, 0x80
Repeat setting advance	16	2, 0x01
Power On	17	2, 0x02
Power Off	18	2, 0x04
Backlight for 30 seconds	19	2, 0x08
Begin FF	20	2, 0x10
Begin REW	22	2, 0x20

The use of the button remote map allows for features that heretofore have not been utilized in multi-communication devices such as an iPod device manufactured by Apple Inc.

A connector interface system for a communication device is disclosed. The interface includes a docking connector. The docking connector includes first make/last break contacts that minimize internal damage to the internal electronics. The docking connector also includes specific keying arrangement to prevent noncompliant connectors from being plugged in, and thereby minimizes potential damage to the multi-communication device. The remote connector provides for the ability to output audio, input audio, and output video using an I/O serial protocol. The connector interface also includes a serial protocol to control device features. These controls help a user sort and search for data more efficiently within the device.

Although the present invention has been described in accordance with the embodiments shown, one of ordinary skill in the art will readily recognize that there could be variations to the embodiments and those variations would be within the spirit and scope of the present invention. Accordingly, many modifications may be made by one of ordinary skill in the art without departing from the spirit and scope of the appended claims.

What is claimed is:

1. A method for transferring button status information between an accessory and a multi-communication device, the method comprising:

determining, by the accessory, when a control in a plurality of controls is activated; and

transmitting, by the accessory, a button status command to the multi-communication device comprising a button status bitmask, the button status bitmask including a status bit associated with each of the plurality of controls,

wherein the plurality of controls includes a play/pause control, a volume up control, and a volume down control, and

wherein the play/pause, volume up, and volume down controls are associated with status bits corresponding to a first lowest-order bit, a second lowest-order bit, and a third lowest-order bit respectively.

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2. The method of claim 1 wherein the button status bitmask further includes a fourth lowest-order bit corresponding to next track, a fifth lowest-order bit corresponding to previous track, a sixth lowest-order bit corresponding to next album, a seventh lowest-order bit corresponding to previous album, and an eighth lowest-order bit corresponding to stop.

3. The method of claim 2 wherein the button status bitmask further includes a ninth lowest-order bit corresponding to play/resume, a tenth lowest-order bit corresponding to pause, and an eleventh lowest-order bit corresponding to mute toggle.

4. The method of claim 3 wherein the button status bitmask further includes a twelfth lowest-order bit corresponding to next chapter, a thirteenth lowest-order bit corresponding to previous chapter, a fourteenth lowest-order bit corresponding to next playlist, a fifteenth lowest-order bit corresponding to previous playlist, and a sixteenth lowest order bit corresponding to shuffle setting advance.

5. The method of claim 4 wherein the button status bitmask further includes a seventeenth lowest-order bit corresponding to repeat setting advance, an eighteenth lowest-order bit corresponding to power on, and a nineteenth lowest-order bit corresponding to power off.

6. The method of claim 5 wherein the button status bitmask further includes a twentieth lowest-order bit corresponding to backlight, a twenty-first lowest-order bit corresponding to begin FF, and a twenty-second lowest-order bit corresponding to begin REW.

7. The method of claim 1 further comprising:

determining, by the accessory, when the control is no longer activated; and

transmitting, by the accessory, another button status command to the multi-communication device comprising a button status bitmask with all status bits set to a state indicating that a corresponding control is not activated.

8. The method of claim 1 wherein the accessory is configured to continuously transmit the button status command to the multi-communication device at a predetermined interval while the control remains activated.

9. A protocol for transferring button status information between an accessory and a multi-communication device, the protocol comprising:

a button status command for indicating that a control in a plurality of controls is activated, the button status command comprising a button status bitmask, the button status bitmask including a status bit associated with each of the plurality of controls,

wherein the plurality of controls include a play/pause control, a volume up control, and a volume down control, and

wherein the play/pause, volume up, and volume down controls are associated with status bits corresponding to a first lowest-order bit, a second lowest-order bit, and a third lowest-order bit respectively.

10. The protocol of claim 9 wherein the button status bitmask further includes a fourth lowest-order bit corresponding to next track, a fifth lowest-order bit corresponding to previous track, a sixth lowest-order bit corresponding to next album, a seventh lowest-order bit corresponding to previous album, and an eighth lowest-order bit corresponding to stop.

11. The protocol of claim 9 wherein the plurality of controls are resident on the accessory, and wherein the accessory is configured to transmit the button status command to the multi-communication device.

12. The protocol of claim 11, wherein the accessory is further configured to:

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determine when the control is no longer activated; and transmit another button status command to the multi-communication device comprising a button status bitmask with all status bits set to a state indicating that a corresponding control is not activated.

13. The protocol of claim 9 wherein the accessory is configured to continuously transmit the button status command to the multi-communication device at a predetermined interval while the control remains activated.

14. An accessory capable of being communicatively coupled with a multi-communication device, the accessory comprising:

a plurality of controls; and

a control component configured to:

determine when a control in the plurality of controls is activated; and

transmit a button status command to the multi-communication device comprising a button status bitmask, the button status bitmask including a status bit associated with each of the plurality of controls,

wherein the plurality of controls includes a play/pause control, a volume up control, and a volume down control, and

wherein the play/pause, volume up, and volume down controls are associated with status bits corresponding to a first lowest-order bit, a second lowest-order bit, and a third lowest-order bit respectively.

15. The accessory of claim 14 wherein the button status bitmask further includes a fourth lowest-order bit corresponding to next track, a fifth lowest-order bit corresponding to previous track, a sixth lowest-order bit corresponding to next album, a seventh lowest-order bit corresponding to previous album, and an eighth lowest-order bit corresponding to stop.

16. The accessory of claim 14 wherein the control component is further configured to:

determine when the control is no longer activated; and

transmit another button status command to the multi-communication device comprising a button status bitmask with all status bits set to a state indicating that a corresponding control is not activated.

17. The accessory of claim 14 wherein the control component is further configured to continuously transmit the button status command to the multi-communication device at a predetermined interval while the control remains activated.

18. The accessory of claim 14 wherein the button status command is transmitted via a connector of the accessory.

19. The accessory of claim 18, wherein the connector includes:

a plurality of pins configured to mate with a corresponding plurality of pins of a connector of the multi-communication device; and

an accessory-identifying resistor connected between two of the plurality of pins.

20. A multi-communication device capable of being communicatively coupled with an accessory, the multi-communication device comprising:

a plurality of controls; and

a control component configured to:

determine when a control in the plurality of controls is activated; and

transmit a button status command to the accessory comprising a button status bitmask, the button status bitmask including a status bit associated with each of the plurality of controls,

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wherein the plurality of controls includes a play/pause control, a volume up control, and a volume down control, and

wherein the play/pause, volume up, and volume down controls are associated with status bits corresponding to a first lowest-order bit, a second lowest-order bit, and a third lowest-order bit respectively.

21. The multi-communication device of claim 20 wherein the button status bitmask further includes a fourth lowest-order bit corresponding to next track, a fifth lowest-order bit corresponding to previous track, a sixth lowest-order bit corresponding to next album, a seventh lowest-order bit corresponding to previous album, and an eighth lowest-order bit corresponding to stop.

22. The multi-communication device of claim 20 wherein the control component is further configured to:
determine when the control is no longer activated; and
transmit another button status command to the accessory comprising a button status bitmask with all status bits set to a state indicating that a corresponding control is not activated.

23. The multi-communication device of claim 20 wherein the control component is further configured to continuously transmit the button status command to the accessory at a predetermined interval while the control remains activated.

24. The multi-communication device of claim 20 wherein the button status command is transmitted via a connector of the multi-communication device.

25. The multi-communication device of claim 24 wherein the connector comprises:

a plurality of pins configured to mate with a corresponding plurality of pins of a connector of the accessory; and
an accessory-identifying resistor connected between two of the plurality of pins.

26. A computer-readable medium having stored thereon program code which, when executed by a control component

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of an accessory, cause the accessory to transfer button status information to a multi-communication device, the program code comprising:

code instructing the control component to determine when a control in a plurality of controls is activated; and

code instructing the control component to transmit a button status command to the multi-communication device, the button status command comprising a button status bitmask, the button status bitmask including a status bit associated with each of the plurality of controls,

wherein the plurality of controls include a play/pause control, a volume up control, and a volume down control, and

wherein the play/pause, volume up, and volume down controls are associated with status bits corresponding to a first lowest-order bit, a second lowest-order bit, and a third lowest-order bit respectively.

27. The computer-readable medium of claim 26 wherein the button status bitmask further includes a fourth lowest-order bit corresponding to next track, a fifth lowest-order bit corresponding to previous track, a sixth lowest-order bit corresponding to next album, a seventh lowest-order bit corresponding to previous album, and an eighth lowest-order bit corresponding to stop.

28. The computer-readable medium of claim 26, wherein the program code further comprises:

code instructing the control component to determine when the control is no longer activated; and

code instructing the control component to transmit another button status command to the multi-communication device comprising a button status bitmask with all status bits set to a state indicating that a corresponding control is not activated.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 7,587,540 B2
APPLICATION NO. : 12/209970
DATED : September 8, 2009
INVENTOR(S) : Donald J. Novotney et al.

Page 1 of 1

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Title Page, Item (56) on page 4, in column 1, under “Other Publications”, line 12, delete “Colloquim” and insert -- Colloquium --, therefor.

Title Page, Item (56) on page 4, in column 1, under “Other Publications”, line 36, delete “Cryptography,” and insert -- Cryptography, --, therefor.

In column 1, line 20-21, delete “concurrently with the present application;” and insert -- September 12, 2008; and --, therefor.

In column 1, line 25-26, delete “concurrently with the present application.” and insert -- September 12, 2008. --, therefor.

In column 1, line 30-31, delete “concurrently with the present application.” and insert -- September 12, 2008. --, therefor.

In column 4, line 37, delete “a)” and insert -- b) --, therefor.

In column 4, line 38, delete “b)” and insert -- c) --, therefor.

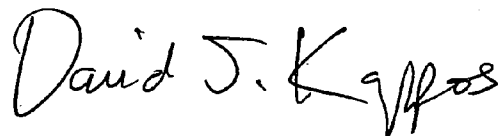
In column 4, line 44, delete “a)” and insert -- b) --, therefor.

In column 4, line 45, delete “b)” and insert -- c) --, therefor.

In column 7, line 17, in claim 4, delete “lowest order” and insert -- lowest-order --, therefor.

Signed and Sealed this

First Day of June, 2010

A handwritten signature in black ink that reads "David J. Kappos". The signature is written in a cursive, flowing style.

David J. Kappos
Director of the United States Patent and Trademark Office

EXHIBIT D

(12) **United States Patent**
Lydon et al.

(10) **Patent No.:** **US 7,590,783 B2**
(45) **Date of Patent:** **Sep. 15, 2009**

(54) **METHOD AND SYSTEM FOR
TRANSFERRING STATUS INFORMATION
BETWEEN A MEDIA PLAYER AND AN
ACCESSORY**

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(73) Assignee: **Apple Inc.**, Cupertino, CA (US)

(*) Notice: Subject to any disclaimer, the term of this
patent is extended or adjusted under 35
U.S.C. 154(b) by 0 days.

(21) Appl. No.: **11/839,263**

(22) Filed: **Aug. 15, 2007**

(65) **Prior Publication Data**

US 2008/0034129 A1 Feb. 7, 2008

Related U.S. Application Data

(63) Continuation of application No. 11/476,262, filed on
Jun. 27, 2006, now Pat. No. 7,305,506, which is a
continuation-in-part of application No. 10/833,689,
filed on Apr. 27, 2004.

(51) **Int. Cl.**
G06F 13/42 (2006.01)

(52) **U.S. Cl.** **710/105**; 710/300; 710/72;
710/63; 710/64

(58) **Field of Classification Search** 710/300–305,
710/62–66, 8–13, 72–74, 313–315, 104–105;
455/557, 575

See application file for complete search history.

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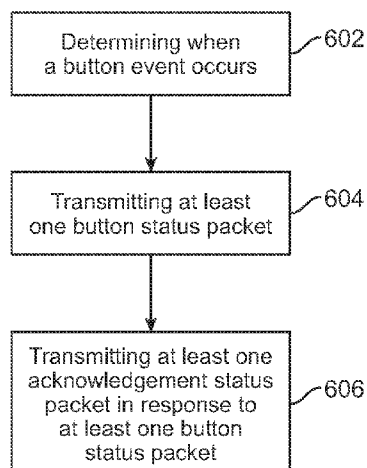
Primary Examiner—Raymond N Phan

(74) *Attorney, Agent, or Firm*—Townsend and Townsend and
Crew LLP

(57) **ABSTRACT**

A method, system, and connector interface for transferring
status information between a media player and an accessory.
The method includes determining, by the accessory, when a
button event occurs; and transmitting, by the accessory, at
least one button status command to the media player, where
the one or more button status commands comprise a context-
specific button status command and at least one command
associated with a particular media type. According to the
method and system disclosed herein, the media player and
accessory may utilize a plurality of commands in a variety of
environments such as within a connector interface system
environment to facilitate the transfer of status information.

38 Claims, 11 Drawing Sheets



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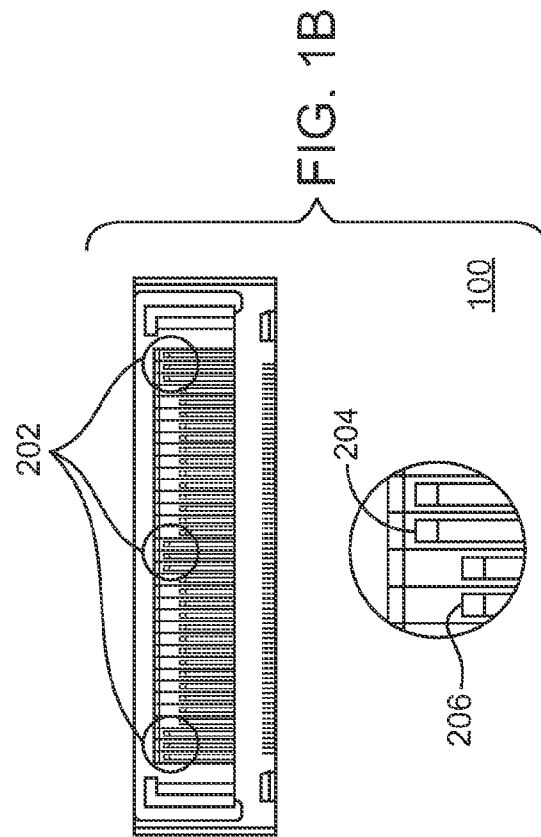
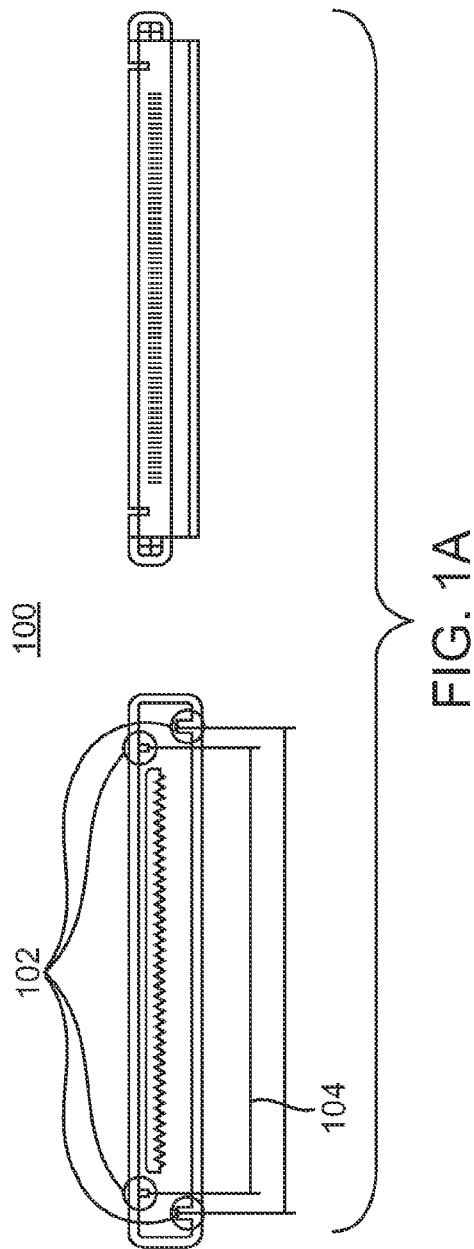
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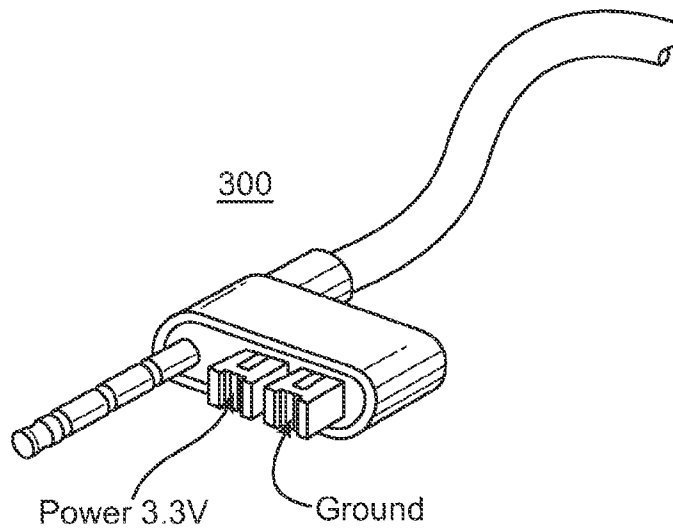
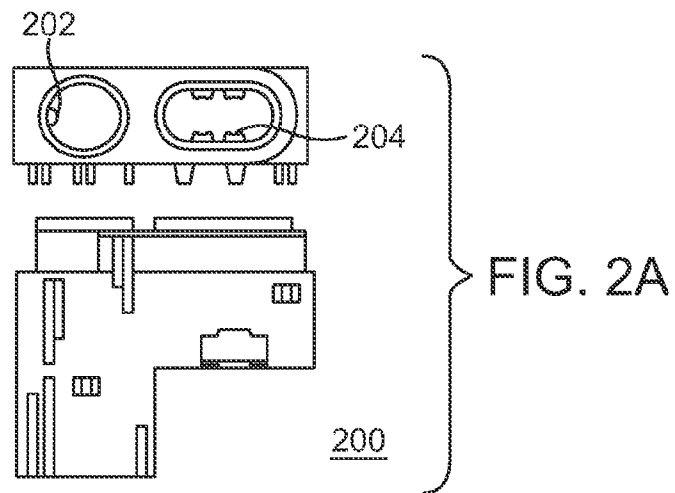


FIG. 2B

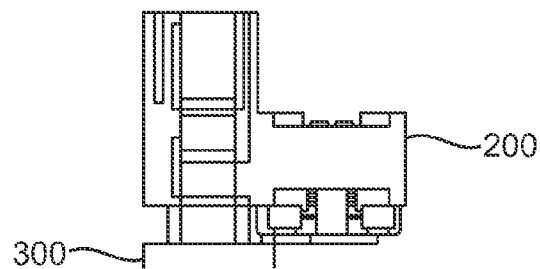


FIG. 2C

Pin	Signal Name	I/O	Function
1	DGND	I	Digital Ground
2	DGND	I	Digital Ground
3	TPA+	I/O	Firewire signal
4	USB D+	I/O	USB signal
5	TPA-	I/O	Firewire signal
6	USB D-	I/O	USB signal
7	TPB+	I/O	Firewire signal
8	USB PWR	I	USB power in. NOT for powering; only to detect USB host
9	TPB-	I/O	Firewire signal
10	Accessory Identify	I	Pull down in dock to notify iPod of specific device
11	F/W PWR+	I	Firewire and charger input power (8V to 30V dc)
12	F/W PWR+	I	Firewire and charger input power (8V to 30V dc)
13	Accessory Pwr(3V3)	O	3.3V output from iPod. Current limited to 100mA.
14	Reserved		
15	DGND	GND	Digital Ground in iPod
16	DGND	GND	Digital Ground in iPod
17	Reserved		
18	Dock Tx	I	Serial protocol (Data to iPod)
19	Dock Rx	O	Serial protocol (Data from iPod)
20	Accessory Detect	I/O	
21	S Video Y	O	Luminance Component

22	S Video C	O	Chrominance Component
23	Video Composite	O	Composite Signal
24	Remote Sense	I	Detect Remote
25	LINE-IN L	I	Line level input to the iPod for the left channel
26	LINE-IN R	I	Line level input to the iPod for the right channel
27	LINE-OUT L	O	Line level output to the iPod for the left channel
28	LINE-OUT R	O	Line level output to the iPod for the right channel
29	Audio Return	GND	Audio return - Signal, never to be grounded inside accessory
30	DGND	GND	Digital Ground iPod
31	Chassis		Chassis ground for connector shell
32	Chassis		Chassis ground for connector shell

FIG. 3A

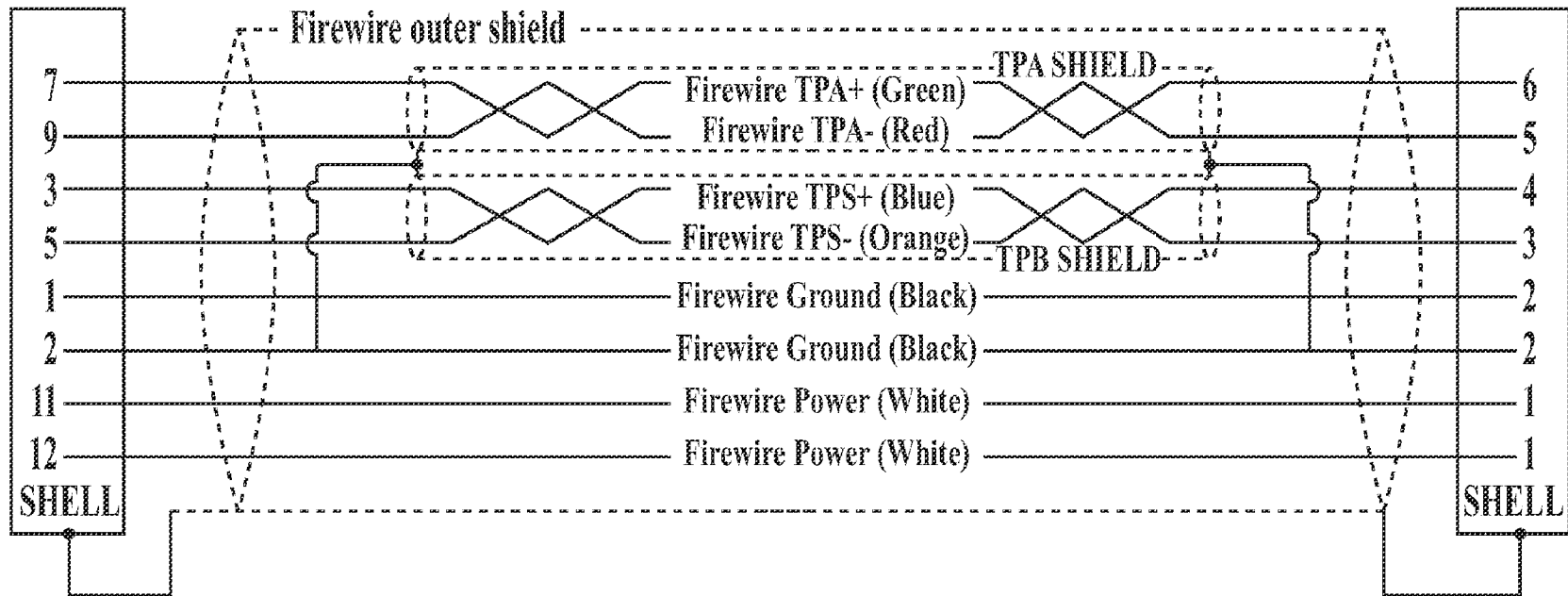


FIG. 4A

Pin	Signal Name	I/O	Function
1	Audio Out Left / Mono Mic In	I/O	30mW audio out left channel, also doubles as mono mic in
2	HP Detect	I	Internal Switch to detect plug insertion
3	Audio Return	GND	Audio return for left and right audio
4	Audio Out Right	O	30mW audio out right channel
5	Composite Video	O	Video Signal
6	Accessory 3.3 V	O	3.3V Accessory power 100mA max
7	Tx	O	Serial protocol (Data from iPod to Device)
8	Rx	I	Serial protocol (Data to iPod from Device)
9	D GND	GND	Digital ground for accessory

FIG. 3B

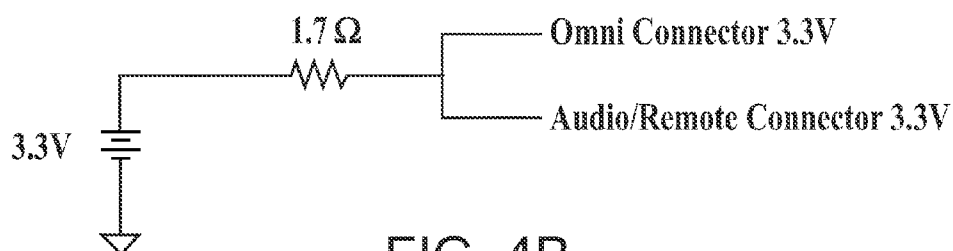


FIG. 4B

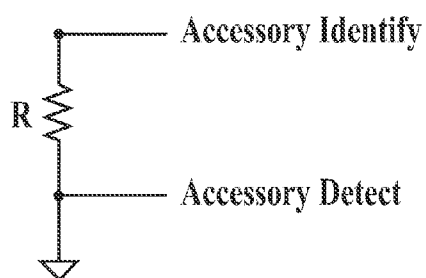


FIG. 4C

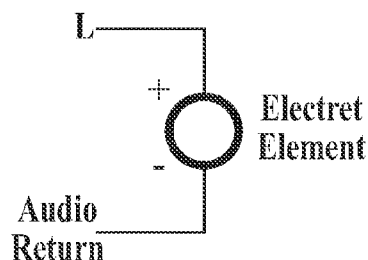


FIG. 4D

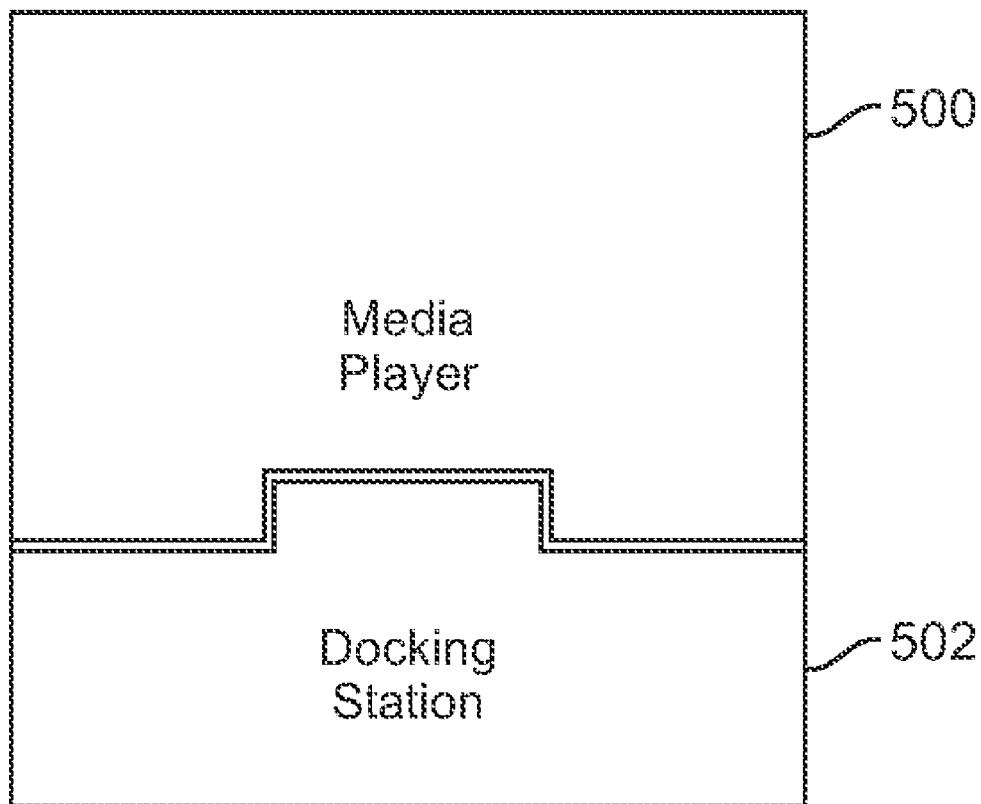


FIG. 5A

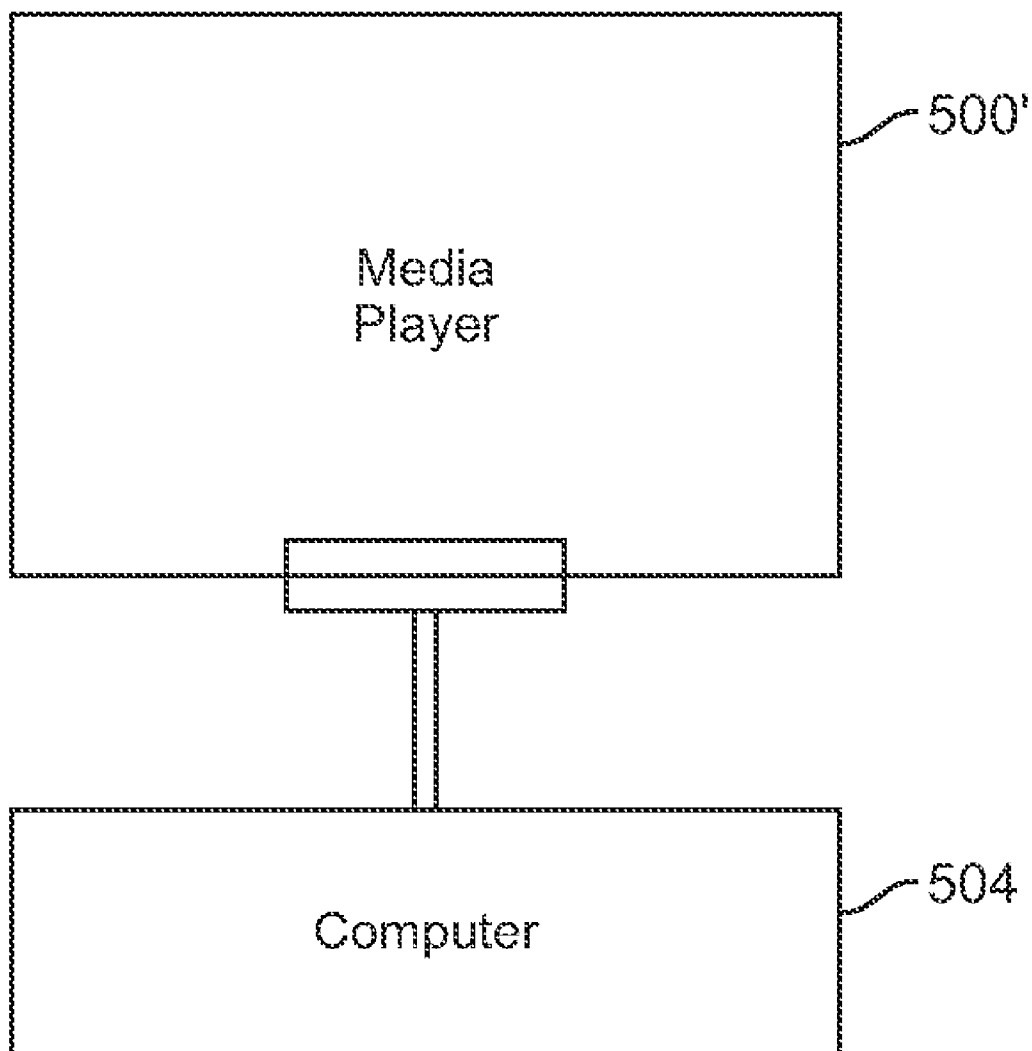


FIG. 5B

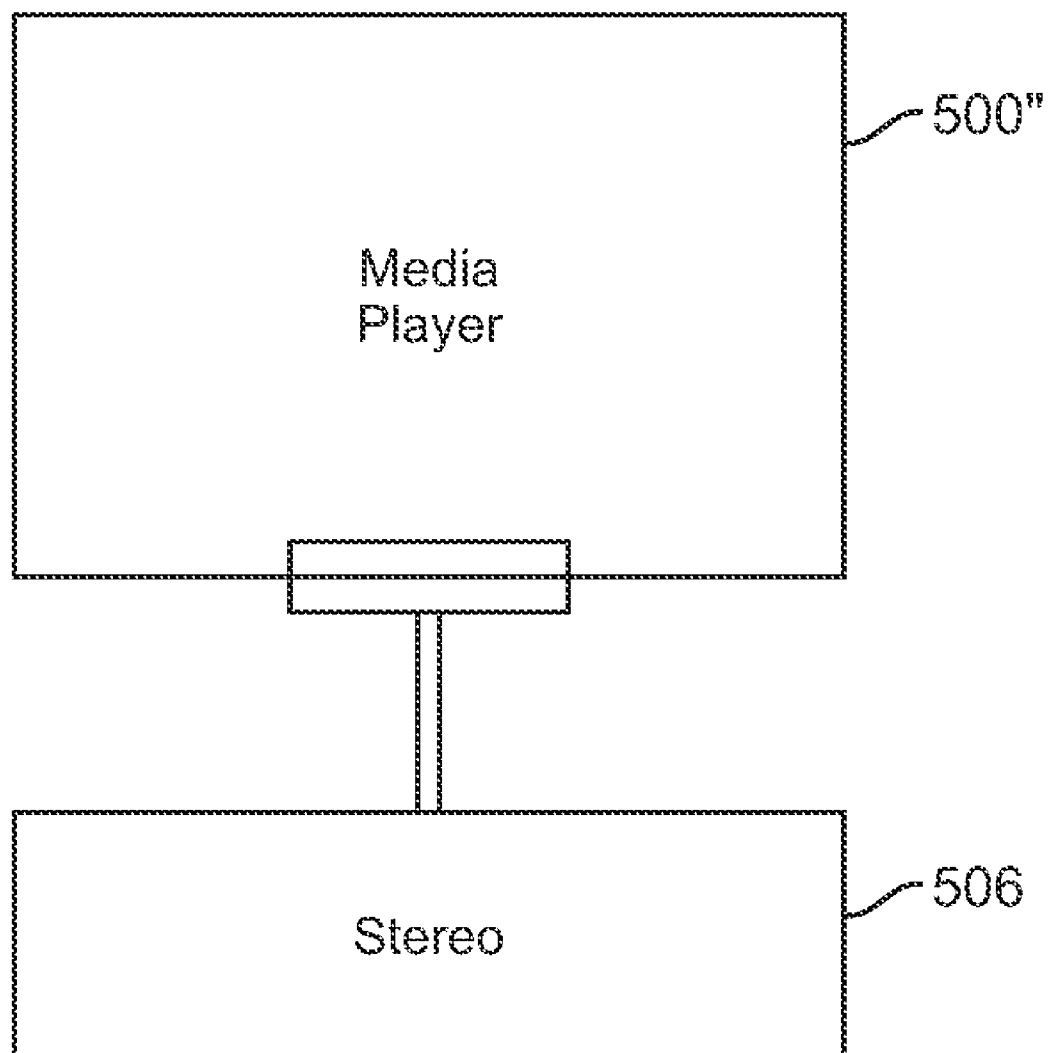


FIG. 5C

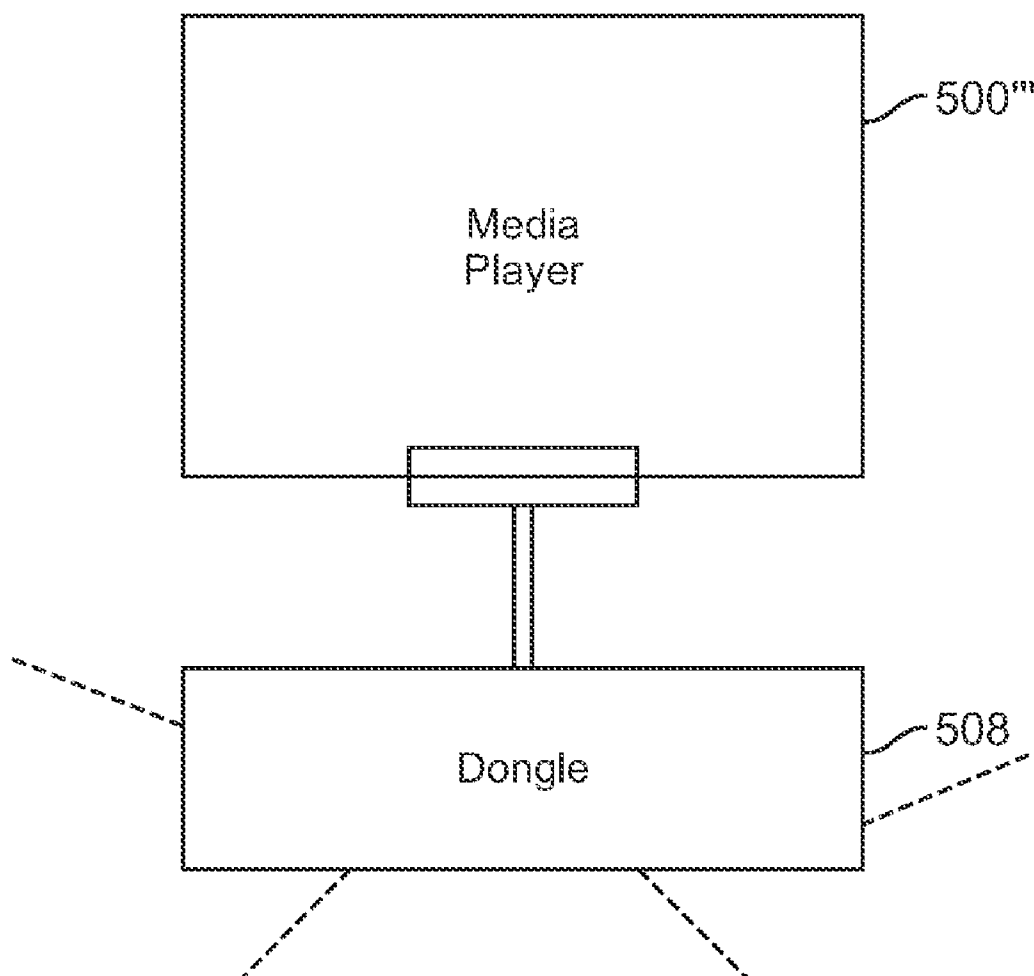


FIG. 5D

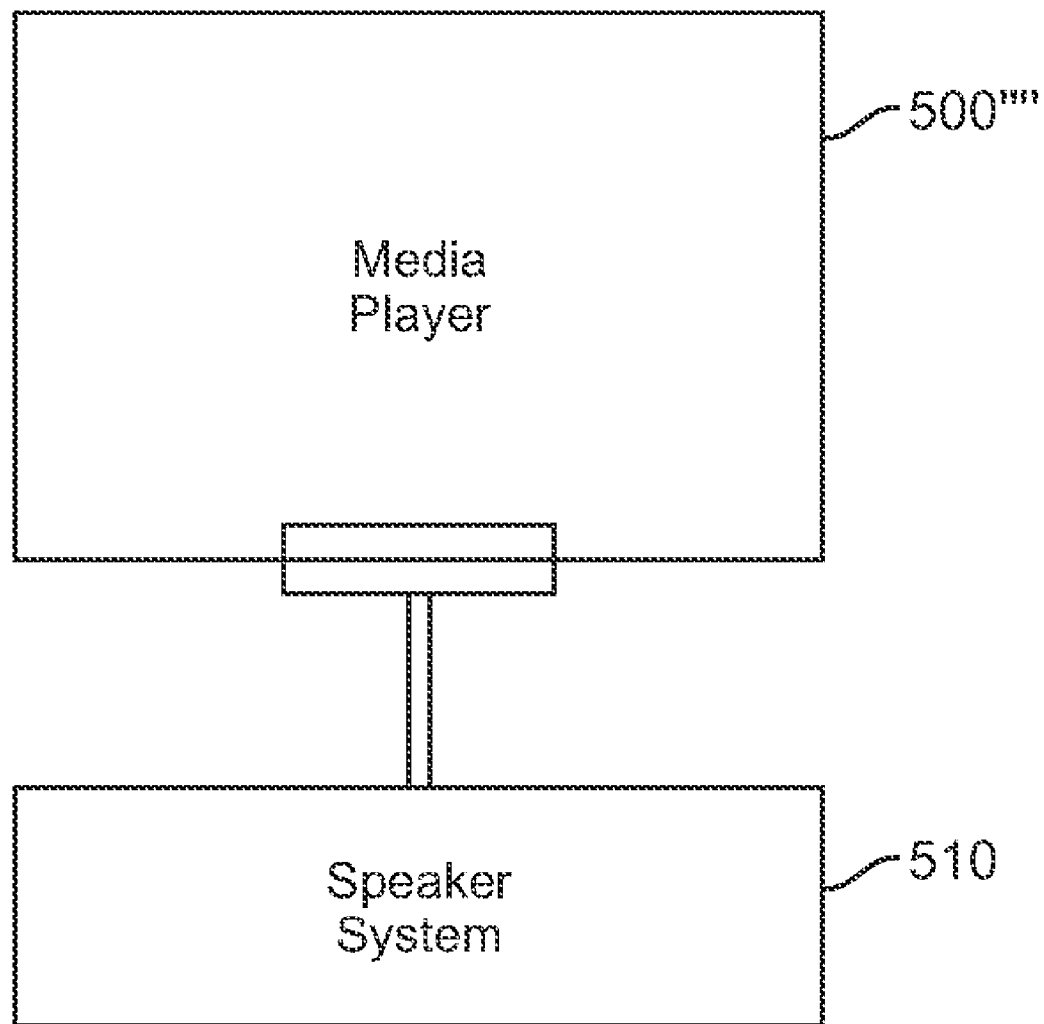


FIG. 5E

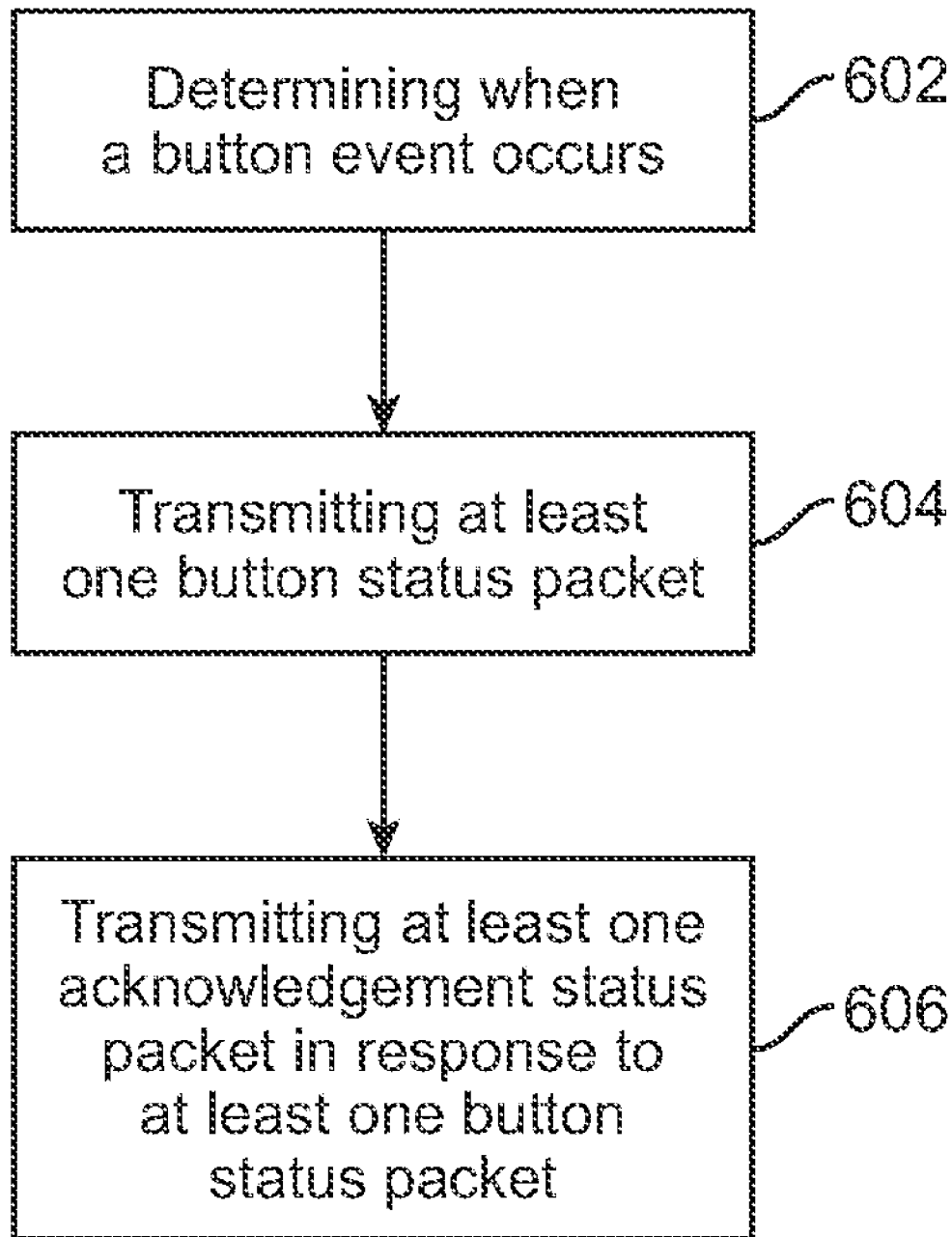


FIG. 6

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METHOD AND SYSTEM FOR TRANSFERRING STATUS INFORMATION BETWEEN A MEDIA PLAYER AND AN ACCESSORY

CROSS-REFERENCES TO RELATED APPLICATIONS

This application is a Continuation of U.S. patent application Ser. No. 11/476,262, now U.S. Pat. No. 7,305,506 entitled "Method and System For Transferring Status Information Between A Media Player And An Accessory", filed on Jun. 27, 2006, which is a Continuation-In-Part of U.S. patent application Ser. No. 10/833,689, entitled "Connector Interface System for a Multi-Communication Device", filed on Apr. 27, 2004, and assigned to the assignee of the present application.

FIELD OF THE INVENTION

The present invention relates generally to electrical devices and more particularly to electrical devices such as media players that communicate with accessory devices.

BACKGROUND OF THE INVENTION

A media player stores media assets, such as audio tracks or photos that can be played or displayed on the media player. One example of a media player is the iPod® media player, which is available from Apple Computer, Inc. of Cupertino, Calif. Often, a media player acquires its media assets from a host computer that serves to enable a user to manage media assets. As an example, the host computer can execute a media management application to manage media assets. One example of a media management application is iTunes®, version 6.0, produced by Apple Computer, Inc.

A media player typically includes one or more connectors or ports that can be used to interface to the media player. For example, the connector or port can enable the media player to couple to a host computer, be inserted into a docking system, or receive an accessory device. There are today many different types of accessory devices that can interconnect to the media player. For example, a remote control can be connected to the connector or port to allow the user to remotely control the media player. As another example, an automobile can include a connector and the media player can be inserted onto the connector such that an automobile media system can interact with the media player, thereby allowing the media content on the media player to be played within the automobile.

With the introduction of various media types (images and video), communication between a media player and an accessory may be confusing to end users. Furthermore, it may be difficult to determine, if at all, whether information has been successfully transferred between a media player and an accessory.

Thus, there is a need for improved techniques to enable manufacturers of electronic devices to exchange information.

BRIEF SUMMARY OF THE INVENTION

A method, system, and connector interface for transferring status information between a media player and an accessory is disclosed. The method includes determining, by the accessory, when a button event occurs; and transmitting, by the accessory, at least one button status command to the media player, where the one or more button status commands com-

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prise a context-specific button status command and at least one command associated with a particular media type.

According to the method and system disclosed herein, the media player and accessory may utilize a plurality of commands utilized in a variety of environments such as within a connector interface system environment to facilitate the transfer of status information.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGS. 1A and 1B illustrate a docking connector in accordance with the present invention.

FIG. 2A is a front and top view of a remote connector in accordance with the present invention.

FIG. 2B illustrates a plug to be utilized in the remote connector.

FIG. 2C illustrates the plug inserted into the remote connector.

FIG. 3A illustrates the connector pin designations for the docking connector.

FIG. 3B illustrates the connection pin designations for the remote connector.

FIG. 4A illustrates a typical FireWire connector interface for the docking connector.

FIG. 4B illustrates a reference schematic diagram for an accessory power source.

FIG. 4C illustrates a reference schematic diagram for a system for detecting and identifying accessories for the docking connector.

FIG. 4D is a reference schematic of an electret microphone that may be connected to the remote connector.

FIG. 5A illustrates a media player coupled to different accessories.

FIG. 5B illustrates the media player coupled to a computer.

FIG. 5C illustrates the media player coupled to a car or home stereo system.

FIG. 5D illustrates the media player coupled to a dongle that communicates wirelessly with other accessories.

FIG. 5E illustrates the media player coupled to a speaker system.

FIG. 6 is a flow chart, which illustrates a process for facilitating communication between a media player and an accessory.

DETAILED DESCRIPTION OF THE INVENTION

The present invention relates generally to electrical devices and more particularly to electrical devices such as media players that communicate with accessory devices. The following description is presented to enable one of ordinary skill in the art to make and use the invention and is provided in the context of a patent application and its requirements. Various modifications to the preferred embodiment and the generic principles and features described herein will be readily apparent to those skilled in the art. Thus, the present invention is not intended to be limited to the embodiment shown but is to be accorded the widest scope consistent with the principles and features described herein.

In a method and system in accordance with the present invention, media players and accessories are able to exchange status information using status commands. For example, in one embodiment, when the accessory determines that a button event occurs, the accessory transmits at least one button status command to the media player. The button status command includes one or more of a context-specific button status command, an image button status command, a video status button command, and an audio button status command. The

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media player may then transmit at least one acknowledgement status command to the accessory in response to the button status command. The media player and the accessory may utilize status commands, which may include commands associated with dedicated button status commands for different media types (e.g. image/slideshow, video, audio, etc.). The commands provide media control commands that support not only basic buttons such as play/pause, volume up, volume down, next track, and previous track but also media control commands that support context specific buttons such as next album, previous album, down arrow, etc. The media player and accessory may utilize the plurality of commands utilized in a variety of environments to facilitate the transfer of status information. One such environment is within a connector interface system environment such as described in detail hereinbelow.

Connector Interface System Overview

To describe the features of the connector interface system in accordance with the present invention in more detail, refer now to the following description in conjunction with the accompanying drawings.

Docking Connector

FIGS. 1A and 1B illustrate a docking connector **100** in accordance with the present invention. Referring first to FIG. 1A, the keying features **102** are of a custom length **104**. In addition, a specific key arrangement is used where one set of keys is separated by one length at the bottom of the connector and another set of keys is separated by another length at the top of the connector. The use of this key arrangement prevents noncompliant connectors from being plugged in and causing potential damage to the device. The connector for power utilizes a Firewire specification for power. The connector includes a first make/last break contact to implement this scheme. FIG. 1B illustrates the first mate/last break contact **202** and also illustrates a ground pin and a power pin related to providing an appropriate first mate/last break contact. In this example, the ground pin **204** is longer than the power pin **206**. Therefore, the ground pin **204** would contact its mating pin in the docking accessory before the power pin **206**, minimizing internal electrical damage of the electronics of the device is minimized.

In addition, a connector interface system in accordance with the present invention uses both USB and Firewire interfaces as part of the same docking connector alignment, thereby making the design more compatible with different types of interfaces, as will be discussed in detail hereinafter. In so doing, more remote accessories can interface with the media player.

Remote Connector

The connection interface system also includes a remote connector which provides for the ability to output and input audio, provides I/O serial protocol, and provides an output video. FIG. 2A is a front and top view of a remote connector **200** in accordance with the present invention. As is seen, the remote connector **200** includes a top headphone receptacle **202**, as well as a second receptacle **204** for remote devices. FIG. 2B illustrates a plug **300** to be utilized in the remote connector. The plug **300** allows the functions to be provided via the remote connector. FIG. 2C illustrates the plug **300** inserted into the remote connector **200**. Heretofore, all of these features have not been implemented in a remote connector. Therefore, a standard headphone cable can be plugged in, but also special remote control cables, microphone cables, and video cables could be utilized with the remote connector.

To describe the features of the connector interface system in more detail, please find below a functional description of

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the docking connector, remote connector and a command set in accordance with the present invention.

Docking and Remote Connector Specifications

For an example of the connector pin designations for both the docking connector and for the remote connector for a media player such as an iPod device by Apple Computer, Inc., refer now to FIGS. 3A and 3B. FIG. 3A illustrates the connector pin designations for the docking connector. FIG. 3B illustrates the connection pin designations for the remote connector.

Docking Connector Specifications

FIG. 4A illustrates a typical Firewire connector interface for the docking connector. The following are some exemplary specifications: Firewire power (8V-30V DC IN, 10W Max). In one embodiment, Firewire may be designed to the IEEE 1394 A Spec (400 Mb/s).

USB Interface

The media player provides two configurations, or modes, of USB device operation: mass storage and media player USB Interface (MPUI). The MPUI allows the media player to be controlled using a media player accessory protocol (MPAP) which will be described in detail later herein, using a USB Human Interface Device (HID) interface as a transport mechanism.

Accessory 3.3 V Power

FIG. 4B illustrates the accessory power source. The media player accessory power pin supplies voltages, for example, 3.0 V to 3.3V+/-5% (2.85 V to 3.465 V) over the 30-pin connector and remote connector (if present). A maximum current is shared between the 30-pin and Audio/Remote connectors.

By default, the media player supplies a particular current such as 5 mA. Proper software accessory detection is required to turn on high power (for example, up to 100 mA) during active device usage. When devices are inactive, they must consume less than a predetermined amount of power such as 5 mA current.

Accessory power is grounded through the Digital GND pins.

FIG. 4C illustrates a reference schematic diagram for a system for detecting and identifying accessories for the docking connector. The system comprises:

- a) A resistor to ground allows the device to determine what has been plugged into docking connector. There is an internal pullup on Accessory Identify within the media player.
- b) Two pins required (Accessory Identify & Accessory Detect)

FIG. 4D is a reference schematic of an electret microphone that may be connected to the remote connector.

Serial Protocol Communication:

- a) Two pins used to communicate to and from device (Rx & Tx)
- b) Input & Output (OV=Low, 3.3V=High)

As mentioned previously, media players connect to a variety of accessories. FIGS. 5A-5E illustrate a media player **500** coupled to different accessories. FIG. 5A illustrates a media player **500** coupled to a docking station **502**. FIG. 5B illustrates the media player **500'** coupled to a computer **504**. FIG. 5C illustrates the media player **500''** coupled to a car or home stereo system **506**. FIG. 5D illustrates the media player **500'''** coupled to a dongle **508** that communicates wirelessly with other devices. FIG. 5E illustrates the media player **500''''** coupled to a speaker system **510**. As is seen, what is meant by accessories includes but is not limited to docking stations,

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chargers, car stereos, microphones, home stereos, computers, speakers, and accessories which communicate wirelessly with other accessories.

As mentioned previously, this connector interface system could be utilized with a command set for transferring status information between a media player and an accessory. In one embodiment, the accessory may be a host computer or any other electronic device or system that may communicate with the media player. It should be understood by one of ordinary skill in the art that although the above-identified connector interface system could be utilized with the command set, a variety of other connectors or systems could be utilized and they would be within the spirit and scope of the present invention. To describe the utilization of the command set in more detail refer now to the following description in conjunction with the accompanying Figure.

Power Conservation

Accessory device power management is important as media players transition to smaller physical sizes with the objective of extending battery life. Also, some accessories may draw power from the media player, and some accessories supply power to the media player. In one embodiment, as an accessory interacts with the media player, the media player may notify the accessory when the media player state changes (e.g., transitions to on/sleep/hibernate/off states, etc.). In one embodiment, accessory power will be in a low-power mode by default, and will be raised to a high-power mode during playback if the accessory requests intermittent high power. A power management policy may be applied for multi-function devices.

In one embodiment, an accessory is responsible for keeping its power consumption below a preset maximum allowed limit for each media player state. For example, as indicated above, the accessory power may be completely shut off when the media player enters hibernate and off states. Accordingly, in such states, an accessory that is powered by a media player will be unable to wake the media player. In one embodiment, if the media player is in a sleep state, the serial accessory should transmit any packets sent to the media player with a sync byte followed by a short delay before sending the packet. When waking from a sleep state, the accessory may be required to re-identify and re-authenticate itself (as with other devices using the device identification commands and/or authentication commands). Self-powered accessories should detect the presence of media player accessory power and initiate the identification process.

Remote Protocol

A remote protocol provides commands that enable the media player and an accessory to interact remotely. For example, as described in more detail below, in one embodiment, some commands enable the accessory to transmit button commands to the media player to manipulate the user interface (UI) of the media player. In one embodiment, the remote protocol transmits to the media player command packets, which contain one or more button status commands, and the media player interprets the button status commands based on a UI application context (e.g., media player UI application context).

Command Functionality

Although a plurality of commands is described hereinbelow, one of ordinary skill in the art recognizes that many other commands could be utilized and their use would be within the spirit and scope of the present invention. Accordingly, the list of commands below is representative, but not exhaustive, of the types of commands that could be utilized to transfer and

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store data between a media player and an accessory. Furthermore, it is also readily understood by one of ordinary skill in the art that a subset of these commands could be utilized by a media player or an accessory and that use would be within the spirit and scope of the present invention. A description of the functionality of some of these commands is described below.

Status Commands

FIG. 6 is a flow chart, which illustrates a process for facilitating communication between a media player and an accessory. As FIG. 6 illustrates, the process begins in step 602 where one of the media player and the accessory determines when a button event occurs. In one embodiment, a button event occurs when a user selects or presses a control button (e.g., on the accessory). In one embodiment, a command may be utilized to determine when a button event has occurred. Next, in step 604 one of the media player and the accessory transmits at least one button status command to the other of the media player and the accessory, wherein the one or more button status commands include one or more of context-specific button status commands, image button status commands, video commands, and audio button status commands. The transmission of the button status reports occurs when a button event occurs. A button status command includes a button status, which is a bitmask representing each button that is currently pressed. In one embodiment, button status commands are transmitted repeatedly to the media player at preset intervals (e.g., between 30-100 ms) while one or more buttons are pressed. When all buttons are released, the accessory transmits a button status command that indicates that no buttons are pressed.

As described in more detail below, there are dedicated button status commands for each media type (e.g., image/slideshow, video, audio, etc.). In one embodiment media control button status bits may be organized such that the most frequently used buttons will be assigned low bit positions. This may reduce the button status command sizes for frequently used buttons. Button status commands provide media control commands that support not only basic buttons such as play/pause, volume up, volume down, next track, and previous track, but also support media control commands that support context specific buttons such as next album, previous album, down arrow, etc. In one embodiment, an accessory may query the remote protocol to determine which particular media control commands the media player supports.

Button status is maintained separately for all ports and all commands. As a result, buttons may be in different states for different media control types. In one embodiment, for a given port and media control type, if a command has not been received within a preset time period after the last button status command, the button status will be reset to an "all buttons up" state.

In some embodiments, some commands may require authentication. For example, context specific send button status commands may require authentication for USB ports. Media control commands require authentication and will therefore require use of a commands for device identification (ID) with an authentication option enabled.

Acknowledge Status Command

Still referring to FIG. 6, in a step 606, one of the media player and the accessory transmits at least one acknowledgement status command to the other of the media player and the accessory in response to at least one button status command. In one embodiment, the media player may transmit an acknowledgement status command to the accessory in response to some, but not necessarily all, commands. The acknowledgement status command includes an acknowl-

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edgement command that indicates a command status, which may include whether the command was received. The command status may also indicate whether the received command does not return any data, whether the received command includes a bad parameter, whether the received command is unsupported by the media player, and/or whether the received command is invalid.

In one embodiment, parameters for the acknowledgment command may include: Command OK, Command failed (valid command, did not succeed), Out of resources (media player internal allocation failed), Bad parameter (command or input parameters invalid), Command pending (cmdPend-Time parameter returned), Not authenticated (not authenticated), Mismatched authentication protocol version, Command ID for which the response is being sent, etc.

In addition to the bitmask that indicates each button that is currently pressed, a status command that the accessory transmits to the media player may include various types of button status commands such as context-specific button status commands, image button status commands, video button status commands, and audio button status commands.

Context-Specific Button Status Command

The context-specific button status command is a command that is associated with particular functions. The accessory transmits a status command containing a context-specific button status command to the media player when a context-specific button event occurs. In one embodiment, parameters for a context-specific button status bitmask may include: PlayPause, VolumeUp, VolumeDown, NextTrack, PreviousTrack, NextAlbum, PreviousAlbum, Stop, Play/resume, Pause, MuteToggle, NextChapter, PreviousChapter, NextPlaylist, PreviousPlaylist, ShuffleSettingAdvance, RepeatSettingAdvance, PowerOn, PowerOff, BacklightFor30Seconds, BeginFF, BeginRew, RemoteMenu, RemoteSelect, RemoteUpArrow, RemoteDownArrow, etc. In one embodiment, the media player may not return an acknowledgement packet to the device in response to this command.

Image Button Status Command

The image button status command is a command that is associated with image-based media (e.g., photos, slide shows, etc.). The accessory transmits a status command containing an image button status command to the media player when an image-specific button event occurs. In one embodiment, parameters for an image-specific button status bitmask may include: PlayPause, NextImage, PreviousImage, Stop, Play/resume, Pause, ShuffleAdvance, RepeatAdvance, etc. In one embodiment, in response to the image button status command, the media player will return an acknowledgement status command to the accessory with the command status.

Video Button Status Command

The video button status command is a command that is associated with video media (e.g., movies, television shows, etc.). The accessory transmits a status command containing a video button status command to the media player when a video-specific button event occurs. In one embodiment, parameters for a video-specific button status bitmask may include: PlayPause, NextVideo, PreviousVideo, Stop, Play/resume, Pause, BeginFF, BeginREW, Next chapter, Previous chapter, Next frame, Previous frame, Caption advance, etc. In one embodiment, in response to the video button status command, the media player will return an acknowledgement status command to the accessory with the command status.

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Audio Button Status Command

The audio button status command is a command that is associated with audio media (e.g., music, audiobooks, podcasts, etc.). The accessory transmits a status command containing an audio button status command to the media player when an audio-specific button event occurs. In one embodiment, parameters for an audio-specific button status bitmask may include: PlayPause, VolumeUp, VolumeDown, NextTrack, PreviousTrack, NextAlbum, PreviousAlbum, Stop, Play/resume, Pause, MuteToggle, NextChapter, PreviousChapter, NextPlaylist, PreviousPlaylist, ShuffleSettingAdvance, RepeatSettingAdvance, BeginFF, BeginRew, Record, etc. In one embodiment, in response to the audio button status command, the media player will return an acknowledgement status command to the accessory with the command status.

A method and system in accordance with the present invention, media players and accessories are able to exchange status information using status commands has been disclosed. In one embodiment, when the accessory determines that a button event occurs, the accessory transmits at least one button status command to the media player. The media player may then transmit at least one acknowledgement status command to the accessory in response to the button status command.

Although the present invention has been described in accordance with the embodiments shown, one of ordinary skill in the art will readily recognize that there could be variations to the embodiments and those variations would be within the spirit and scope of the present invention. For example, the present invention can be implemented using hardware, software, a computer readable medium containing program instructions, or a combination thereof. Software written according to the present invention is to be either stored in some form of computer-readable medium such as memory or CD-ROM, or is to be transmitted over a network, and is to be executed by a processor. Consequently, a computer readable medium is intended to include a computer readable signal, which may be, for example, transmitted over a network. Accordingly, many modifications may be made by one of ordinary skill in the art without departing from the spirit and scope of the appended claims.

What is claimed is:

1. A method for operating a media player, the method comprising, by an accessory communicably coupled to the media player:

detecting a button event corresponding to a user operating a control of the accessory; and

in response to the button event, transmitting to the media player a button status command selected from a group consisting of a context-specific button status command associated with particular functions of the media player and one or more media-type-specific button status commands, each media-type-specific button status command being associated with a different media type,

wherein the button status command includes state information indicating a current state of the control, the state information being usable by the media player to determine an action to be performed, the determination being based at least in part on whether the button status command is the context-specific button status command or the media-type-specific button status command.

2. The method of claim 1 wherein the state information includes a bitmask and wherein each bit in the bitmask represents a current status of a control on the accessory.

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3. The method of claim 1 wherein the context-specific button status command is interpreted by the media player in a context associated with an active application executing on the media player.

4. The method of claim 1 further comprising:

receiving from the media player an acknowledgement status command in response to the button status command.

5. The method of claim 1 wherein the one or more media-type specific button status commands include:

an image button status command associated with playback of still images;

a video button status command associated with playback of video; and

an audio button status command associated with playback of audio.

6. The method of claim 1 wherein the state information for the context-specific button status command indicates the state of each of at least:

a play/pause control;

a volume control;

a next track control; and

a previous track control.

7. The method of claim 1 wherein the state information includes a bitmask comprising a plurality of bits, each bit corresponding to a controllable function of the media player, wherein the correspondence of the bits to the controllable functions depends on whether the button status command is the context-specific button status command or the media-type-specific button status command.

8. The method of claim 2 wherein the bits in the bitmask are arranged such that the most frequently used controls are assigned low bit positions.

9. The method of claim 3 wherein the media-type-specific button status command is interpreted by the media player in a context associated with an application on the media player that plays media of the specific type.

10. The method of claim 5 wherein the state information for the image button status command indicates the state of each of at least:

a play/pause control;

a next image control; and

a previous image control.

11. The method of claim 5 wherein the state information for the video button status command indicates the state of each of at least:

a play/pause control;

a next video control;

a previous video control;

a fast-forward control;

a rewind control;

a previous chapter control; and

a next chapter control.

12. The method of claim 5 wherein the state information for the audio button status command indicates the state of each of at least:

a play/pause control;

a volume control;

a next track control;

a previous track control;

a next album control; and

a previous album control.

13. The method of claim 6 wherein the state information for the context-specific button status command further indicates the state of each of at least:

a next album control;

a previous album control;

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an up arrow control; and

a down arrow control.

14. A method for operating a media player communicably coupled to an accessory, the method comprising, by the media player:

receiving from the accessory a button status command selected from a group consisting of a context-specific button status command associated with particular functions of the media player and one or more media-type-specific button status commands, each media-type-specific button status command being associated with a playback application for a different media type,

wherein the button status command includes state information indicating a current state of a user-operable control of the accessory;

in the event that the button status command is the context-specific button status command, using the state information to determine an action to be taken in a currently active media application without regard to media type; and

in the event that the button status command is one of the media-type-specific button status commands, using the state information to determine an action to be taken in an application for playing back media of the associated media type.

15. The method of claim 14 wherein the state information includes a bitmask and wherein each bit in the bitmask represents a current status of a control on the accessory.

16. The method of claim 14 further comprising:

transmitting to the accessory an acknowledgement status command in response to the button status command.

17. The method of claim 14 wherein the one or more media-type specific button status commands include:

an image button status command associated with a playback application for still images;

a video button status command associated with a playback application for video; and

an audio button status command associated with a playback application for audio.

18. The method of claim 14 wherein the state information includes a bitmask comprising a plurality of bits, each bit corresponding to a controllable function of the media player, wherein the correspondence of the bits to the controllable functions depends on whether the button status command is the context-specific button status command or the media-type-specific button status command.

19. The method of claim 15 wherein the bits in the bitmask are arranged such that the most frequently used controls are assigned low bit positions.

20. An accessory for use with a media player, the accessory comprising:

an interface configured to communicably couple the accessory to a media player;

at least one control operable by a user of the accessory; and

control logic coupled to the control and the interface, the control logic being configured to detect a button event corresponding to a user operating the at least one control and to transmit to the media player, in response to the button status event, a button status command selected from a group consisting of a context-specific button status command associated with particular functions of the media player and one or more media-type-specific button status commands, each media-type-specific button status command being associated with a different media type,

wherein the button status command includes state information indicating a current state of the control, the state

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information being usable by the media player to determine an action to be performed, the determination being based at least in part on whether the button status command is the context-specific button status command or the media-type-specific button status command.

21. The accessory of claim 20 wherein the state information includes a bitmask and wherein each bit in the bitmask represents a current status of a control on the accessory.

22. The accessory of claim 20 wherein the context-specific button status command is interpreted by the media player in a context associated with an active application executing on the media player.

23. The accessory of claim 20 wherein the control logic is further configured to receive from the media player an acknowledgement status command in response to the button status command.

24. The accessory of claim 20 wherein the one or more media-type specific button status commands include:

an image button status command associated with playback of still images;

a video button status command associated with playback of video; and

an audio button status command associated with playback of audio.

25. The accessory of claim 20 wherein the state information for the context-specific button status command indicates the state of each of at least:

a play/pause control;

a volume control;

a next track control; and

a previous track control.

26. The accessory of claim 20 wherein the state information includes a bitmask comprising a plurality of bits, each bit corresponding to a controllable function of the media player, wherein the correspondence of the bits to the controllable functions depends on whether the button status command is the context-specific button status command or the media-type-specific button status command.

27. The accessory of claim 21 wherein the bits in the bitmask are arranged such that the most frequently used controls are assigned low bit positions.

28. The accessory of claim 22 wherein the media-type-specific button status command is interpreted by the media player in a context associated with an application on the media player that plays media of the specific type.

29. The accessory of claim 24 wherein the state information for the image button status command indicates the state of each of at least:

a play/pause control;

a next image control; and

a previous image control.

30. The accessory of claim 24 wherein the state information for the video button status command indicates the state of each of at least:

a play/pause control;

a next video control;

a previous video control;

a fast-forward control;

a rewind control;

a previous chapter control; and

a next chapter control.

31. The accessory of claim 24 wherein the state information for the audio button status command indicates the state of each of at least:

a play/pause control;

a volume control;

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a next track control;
a previous track control;
a next album control; and
a previous album control.

32. The accessory of claim 25 wherein the state information for the context-specific button status command further indicates the state of each of at least:

a next album control;

a previous album control;

an up arrow control; and

a down arrow control.

33. A media player comprising:

control logic configured to execute a plurality of applications for playing back stored media, each application associated with a different media type;

an interface configured to communicably couple the media player to an accessory; and

command logic coupled to the control logic and the interface, the command logic being configured to receive from the accessory a button status command selected from a group consisting of a context-specific button status command associated with particular functions of the media player and one or more media-type-specific button status commands, each media-type-specific button status command being associated with a playback application for a different media type, wherein the button status command includes state information indicating a current state of a user-operable control of the accessory,

wherein the control logic is further configured such that:

in the event that the button status command is the context-specific button status command, the control logic uses the state information to determine an action to be taken in a currently active media application without regard to media type; and

in the event that the button status command is one of the media-type-specific button status commands, the control logic uses the state information to determine an action to be taken in an application for playing back media of the specific type.

34. The media player of claim 33 wherein the state information includes a bitmask and wherein each bit in the bitmask represents a current status of a control on the accessory.

35. The media player of claim 33 wherein the command logic is further configured to transmit to the accessory an acknowledgement status command in response to the button status command.

36. The media player of claim 33 wherein the one or more media-type specific button status commands include:

an image button status command associated with a playback application for still images;

a video button status command associated with a playback application for video; and

an audio button status command associated with a playback application for audio.

37. The media player of claim 33 wherein the state information includes a bitmask comprising a plurality of bits, each bit corresponding to a controllable function of the media player, wherein the correspondence of the bits to the controllable functions depends on whether the button status command is the context-specific button status command or the media-type-specific button status command.

38. The media player of claim 34 wherein the bits in the bitmask are arranged such that the most frequently used controls are assigned low bit positions.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 7,590,783 B2
APPLICATION NO. : 11/839263
DATED : September 15, 2009
INVENTOR(S) : Gregory T. Lydon et al.

Page 1 of 1

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

On page 3, in column 2, under “Foreign Patent Documents”, line 25, delete “2002-347447” and insert -- 2002-374447 --, therefor.

In column 4, line 50, after “Detect)” insert -- . --.

In column 4, line 55, after “Tx)” insert -- . --.

In column 4, line 56, after “High)” insert -- . --.

In column 9, lines 8-9, in claim 5, delete “media-type specific” and insert -- media-type-specific --, therefor.

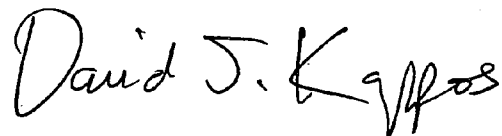
In column 10, line 33, in claim 17, delete “media-type specific” and insert -- media-type-specific --, therefor.

In column 11, line 18, in claim 24, delete “media-type specific” and insert -- media-type-specific --, therefor.

In column 12, line 49, in claim 36, delete “media-type specific” and insert -- media-type-specific --, therefor.

Signed and Sealed this

Twenty-fifth Day of May, 2010

A handwritten signature in black ink that reads "David J. Kappos". The signature is written in a cursive, flowing style with a large, stylized 'D' and 'K'.

David J. Kappos
Director of the United States Patent and Trademark Office